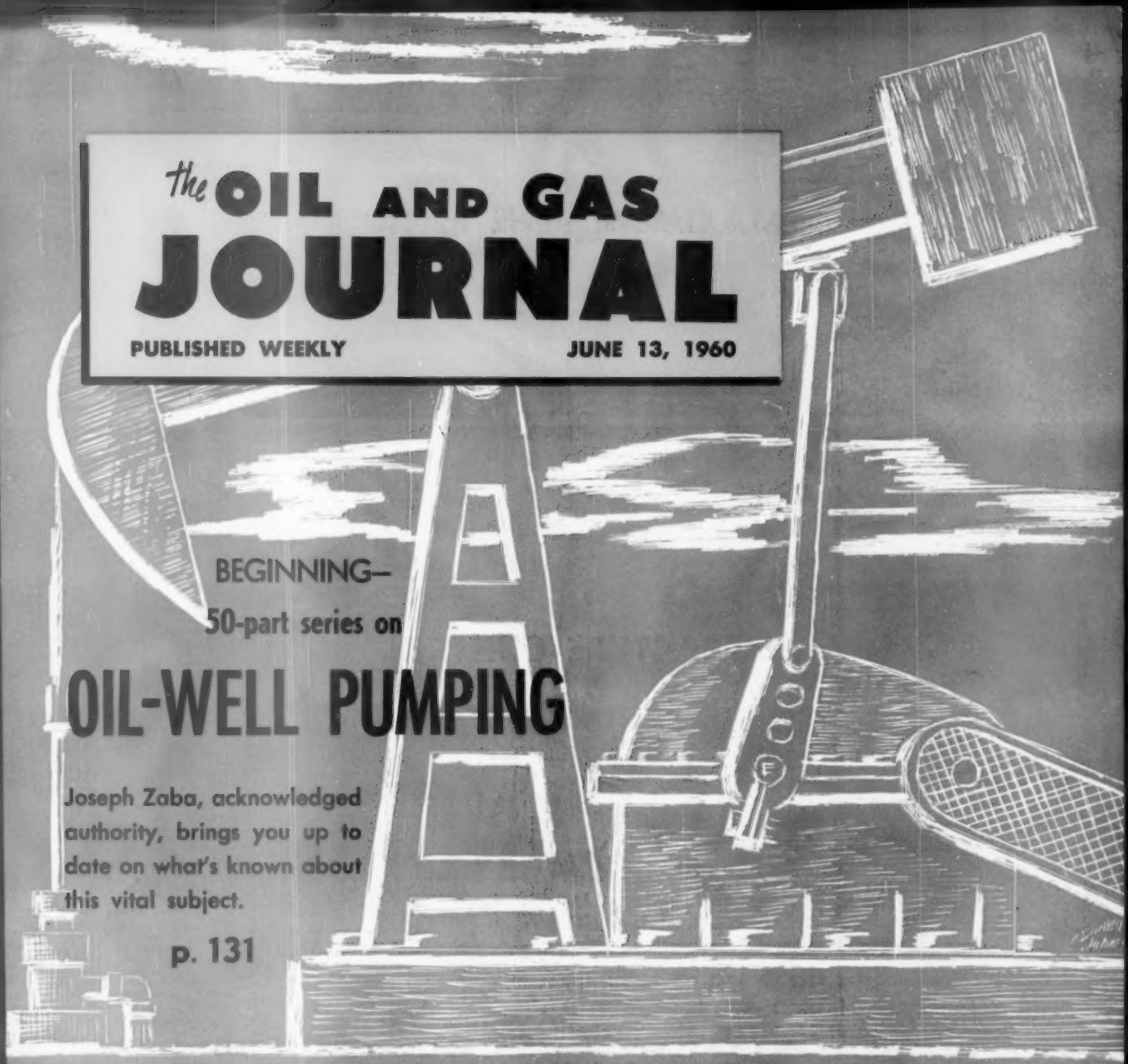
the OIL AND GAS JOURNAL

PUBLISHED WEEKLY JUNE 13, 1960



BEGINNING—
50-part series on

OIL-WELL PUMPING

Joseph Zaba, acknowledged authority, brings you up to date on what's known about this vital subject.

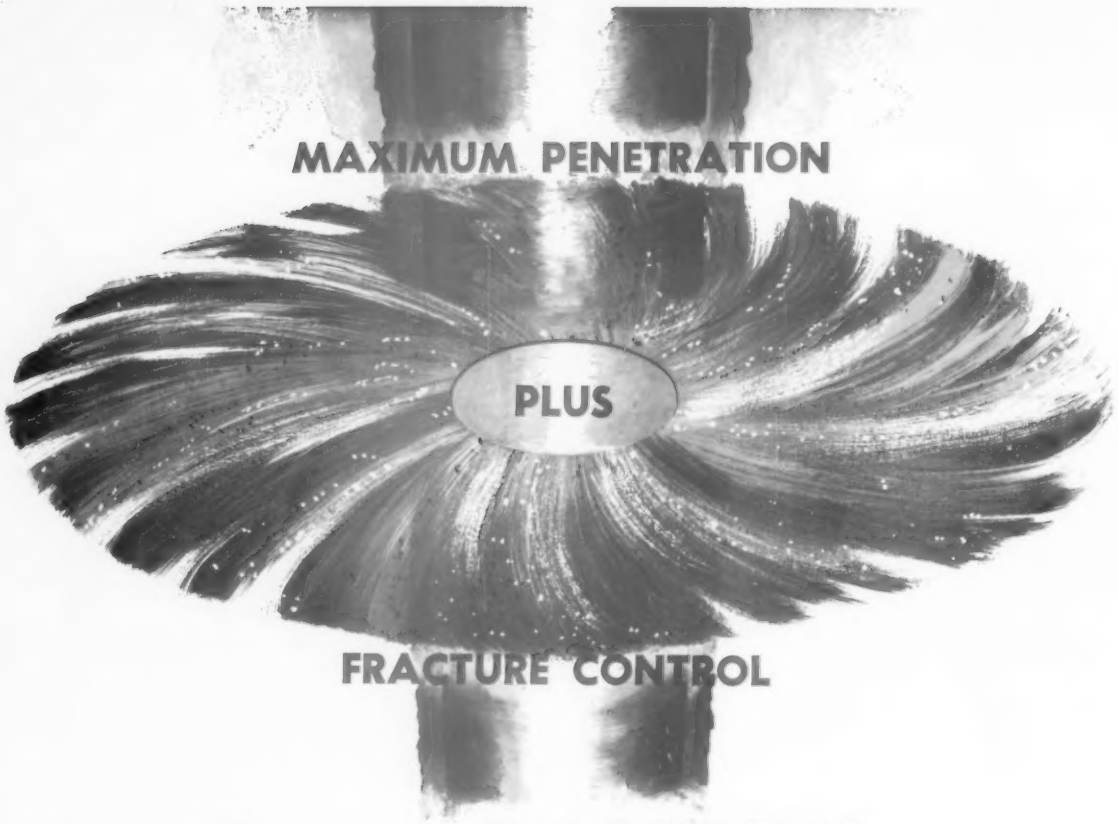
p. 131

Gasoline-motor oil ratio worries lube salesmen ▸63

Texas headache: Regulation of secondary recovery ▸70

Bids asked on two Libyan pipelines ▸84

Can we salvage another 44 billion barrels ▸97



with

WESTERN'S SANDRIL

Hydraulic Perforating Process

- Superior single-point entry for effective treatment and production
- Greatest possible penetration into the formation
- Proved fracture control in the formation
- Fracture Initiation or Under-Reaming patterns

Single-point entry utilizing Sandril hydraulic perforating process is daily reaping bonus benefits for operators throughout the Southwest. Sandril Fracture Initiation and Under-Reaming patterns employ single-point entry and attain maximum penetration into the formation on a horizontal plane.

Fracturing then extends the initiated fracture in all directions from the well bore in the same plane. Water and gas problems are minimized, and production period before rework is greatly extended in most cases.

Get all the details on efficient Sandril single-point entry from your Western Engineer. Call him!

THE WESTERN COMPANY

General Offices: P. O. Box 186, Fort Worth, Texas

SERVICE DISTRICTS THROUGHOUT THE SOUTHWEST

WESTERN Engineered WELL SERVICES

OIL AND GAS JOURNAL
Vol. 58, No. 24

Contents June 13, 1960

THE WEEK'S NEWS

General Interst:
Two FTC Cases Will Affect Nation's Marketers ... 66
FPC May Be Short Two Commissioners for Months ... 66
Gulf Will Pursue Imports Case in Appeals Court ... 66
Texans Back Halbouty's Conservation Program ... 68
Those "Falling" Stock Figures Are Deceptive ... 69
Idea of Russian Imports Irks Western Canadian Oil Men ... 69
Bolivian Government Company Wins U. S. Loan ... 78

Processing:
Lagging Lube-Gasoline Ratio Worries Refiners ... 63
Processing Briefs ... 76
West Coast Refiners Face a New Set of Rules ... 77
SAE Meeting Adds More Information on TML ... 80
Military Studying Fuel Cell for Field Applications ... 80

Pipelining:
Kansas Independents Fight for Use of Derby Crude Line ... 65
Pipeline Briefs ... 72

Foreign News:
Cuba Won't Force Refiners to Use Russian Crude ... 82
Russians Claim Big Siberian Oil Discovery ... 82
Contractors Asked to Bid on Two Libyan Pipeline Projects ... 84
Japanese Company Steps Up Persian Gulf Activity ... 85
North Africa-to-Italy Offshore Line Studied ... 87
Saudi Arabian Company Will Build Refinery on Red Sea ... 88
Foreign Briefs ... 88

Drilling-Production:
Railroad Commission Tackles Problem of Water Flood Proration ... 70
Louisiana Moves to Restrict Multiple Completions ... 72
Seventh Kenai Well Hits Gas, Two Alaskan Wells Are Dry ... 74
Atlantic Wildcat May Be Texas' Deepest Producer ... 74
Cities Service Plans Injection Project in Dora Roberts Field ... 78
Platform Going Up on Costly California Offshore Lease ... 81

Exploration:
Navy Seeks to Declare Offshore California Area Closed to Oil ... 65
New Scouting Service Started in Texas-New Mexico Area ... 78
Cambrian Strike Gives Nebraska Wildcatters Another Objective ... 167
Kanab Region of Arizona-Utah May Be Oil Country ... 168
Overdue Wildcat Will Test Oregon's Willamette Valley ... 172

REGULAR FEATURES

Advertisers' Index ... 199
Calendar of Events ... 49
Classified Advertising ... 196
Drilling Contractors ... 162
Drilling Statistics ... 191
Editorial ... 59
Equipment Men ... 159
Exploration Highlights ... 167
Foreign News ... 82
Journally Speaking ... 57
Markets ... 194
New Equipment ... 146
Personals ... 186
Process Costimating ... 116
Production ... 192
Refinery Cost Indexes ... 128
Refining Statistics ... 193
Selected Monthly Data ... 195
Statistical Summary ... 190
The Journal Said ... 57
They Say ... 44
Trade Literature ... 157
Watching Washington ... 67
Who's Who in Oil ... 186

Technology-Operation section on next page →

The Oil and Gas Journal is published weekly by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa 3, Okla. Second-Class postage paid at Tulsa, Okla. Copyright 1960 by The Petroleum Publishing Co. United States and foreign rates to the petroleum industry, 1 year $5, 2 years $8, 3 years $10.

TECHNOLOGY—OPERATION

Refining-Processing

Fluid Coker Runs a Record 578 Days 93

By D. H. Stormont

The 42,000-bbl. unit at Tidewater's Avon refinery processed nearly 17 million barrels of charge stock during this period. Inspection showed most parts of the unit were in excellent mechanical condition but some parts had to be refurbished or replaced.

Vacuum Cleaner Removes Old Catalyst 103

A two-stage vacuum jet is used to remove clay and catalyst from reactors on the catalytic reformer at Ohio Oil's Robinson refinery.

Process Costimating—73 116

Operating costs—hydrodesulfurization.

Refining Cost Indexes 128

Isopolyesters Can Cut Maintenance Costs 135

Isophthalic polyester resins are reducing maintenance costs at Standard Oil's Richmond, Calif., refinery.

Crude Analysis by Chromatography 138

By John C. Winters

Here's a procedure for separating light naphtha from crude, separating the naphtha components, and measuring separated components by chromatography.

Pipelining

What's Happening to Hot-Applied Coatings? 104

By N. T. Shideler

Few topics in pipelining have been discussed more than have protective coatings since new materials began to force their way into the picture. This provocative article presents the controversy from the point of view of an expert long associated with hot-applied coal-tar coatings.

Drilling-Production

Can We Salvage Another 44 Billion Barrels? 97

By Paul D. Torrey

Yes, say the experts. And this additional ultimate recovery for the U. S. will come from the new recovery methods like in situ combustion and miscible-phase flooding. IOOC committee report shows U. S. is self-sufficient in its oil requirements for the foreseeable future.

Buying and Operating Short-Cycle Units 113

Shell Oil's experience shows that short-cycle adsorption units provide a dependable method for dehydration and recovery of hydrocarbons from high-pressure gas streams. Application should in general be limited to low-volume lean-gas streams. Attractive payouts can be realized.

How to Apply and Remove Shrunk-On Tool Joints 120

By E. G. Boice

When drill pipe is worn or damaged, tool joints can be removed and applied to new pipe. And the pipe can be economically rejointed on location even as drilling progresses.

Oil-Well Pumping: A Series 131

By Joseph Zaba

This series on oil-well pumping methods supplements the author's original articles on the subject which were published serially by The Oil and Gas Journal beginning July 1, 1943. Much has happened in the intervening 17 years. This 50-part series will bring the subject up to date.

Standard-Volume Controller for LACT Units 143

By G. L. Farrar

A new measuring setup enables an oil-field-metering separator to dump a temperature-compensated volume every time, regardless of variations in oil gravity and temperature.

the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
June 13, 1960

Some of the oil-industry gloom is lifting:

The marketing sector, a pretty good barometer, is showing more activity: Consumer demand is fair. Products stocks have fallen. Market prices in some areas are stiffening. Refinery runs are staying below 8,000,000 bbl. daily, a figure considered the danger point (p. 190)*.

Crude stocks are still 10,000,000 bbl. above a comfortable level for this time of year, indicating a tight grip on production is still desirable.

The outlook: If crude output remains same, runs don't climb, and volume of distress products shrinks, then prices should rise to profitable levels.

Prospect for lube oils gives this mixed picture:

Demand is increasing—but at a slower pace.

Prices for lube crudes are high, may go higher, but profits on lube-product sales are too slim.

Big worry of lube salesmen is still the poor ratio of motor-oil sales to gasoline sales (p. 63).

▼ ▼ ▼

Story on drilling so far this year: Fewer wells but deeper (p. 191).

Operators have finaled 18,061 wells—13.8% fewer than 20,960 wells completed at this time last year.

Footage completed, however, is 79,178,545, or 9.4% less than the 87,341,148 ft. for same time last year.

Failure apparently mocks Alaska's closely watched Nulato wildcat—it reportedly is being abandoned as dry.

Wildcat was taken to 12,000 ft. before decision to quit was made by Paul G. Benedum and others interested. It is the first test of the Koyukuk basin in west central Alaska.

Meanwhile, the Kenai peninsula has a gas producer in the Swanson River unit and at least 20 geological parties are in the field this summer in stepped up exploration work.

---

*Refers to article in this issue giving more details. Where no page is given, the item is a Newsletter exclusive.

That Kansas crude scrap is becoming a real fight.

Embattled producers, who successfully shut in fields rather than take a 20-cent price cut posted by Derby, now have:

...Formed a marketing company to sell the crude.

...Found a market for 2,000 bbl. daily with Phillips and APCO if they can move oil over Derby's pipeline.

...Started fight to declare Derby pipeline a common carrier and thus win an outlet for the crude. Hearing on this plea will be held by corporation commission June 24.

Derby, meanwhile, says it will appeal the shut-down order to district court (p. 68).

A sense of urgency is behind Texas' decision to tackle the problem of regulating mushrooming secondary-recovery operations.

Some real giant fields in Texas are approaching the secondary-recovery stage—uncontrolled production from them could play hob with the proration system (p. 70).

▼ ▼ ▼

Pipelining is warming up in North Africa.

...Work on two major crude lines in Libya should start within a few months. Bids have been asked on two big-inch lines by Esso Standard and Oasis. Esso plans a 30-in. line from Zelten field to the Marsa el Brega terminal and Oasis plans a 30 or 42-in. line from Dahra to the coast (p. 84).

...Engineering studies for natural-gas line across the Mediterranean from North Africa to Sicily are in progress. Italian interests are back of the proposal to move Sahara gas into Italy and later possibly into West Germany (p. 87).

Texas Eastern's Little Big Inch products system from Houston to Lebanon, Ohio, will be tied in with the Buckeye system at Lima, Ohio, this fall.

The tactical move will provide through pipeline transportation for points beyond Lebanon and will beat high combination pipeline-rail rates for LPG. The 90-mile, 10-in. link between Lebanon and Lima will be a joint undertaking of Texas Eastern and Buckeye.

A revolutionary type of underground gas storage may emerge from an experiment of Northern Illinois Gas.

Company engineers are testing a theory that a wall of water can ride herd on a mass of gas, keeping it collected in the form of a huge bubble against the cap rock of an underground formation.

Test is using air instead of gas. Water wells inject water into the formation to form a circle around the gas. Results won't be known until late summer (p. 76).

Signs indicate a turn for the better in oil-government relations in Venezuela. But pessimistic oil men operating in the country are almost afraid to hope.

Tax concessions to encourage almost nonexistent exploration are being hinted increasingly by Minister of Mines Perez Alfonzo, who is still talking only in generalities, but more often.

Behind the government concern: Production rate is considerably less than the annual 4% increase which Perez Alfonzo has promised critics of his policies. The country's one remaining seismic party is expected to fold up by mid-July.

Showing the Government feeling is its swift and sure crackdown on a wildcat strike by 1,200 Mobil Oil workers at Anaco. Officials called the strike illegal and ordered the workers back to their jobs in less than 36 hours. The cause: Mobil stacked a rig and laid off 55 workers.

The Russian front: Western Canadians are fighting deal to import Russian gasoline into their eastern markets... American refiners in Cuba also are balking at Castro request they use Russian crude (p. 82)...The Soviets themselves are claiming a major oil discovery in Siberia (p. 82).

▼ ▼ ▼

The Washington beat:

Quiet search is being made for replacement for Capt. Matthew V. Carson, who plans to resign as oil import boss by year's end. The aim: Get a man like Carson who has some knowledge of the industry but isn't identified with any particular segment.

The FPC still hopes to add 80 men to its staff to help trim case backlog. House appropriations committee cut its request to 40, but Senate committee is now considering FPC plea to restore the cut.

FPC also has trouble at the top—it may operate with only three commissioners, instead of five, for next 6 months. The Senate is dragging its feet on approving two appointees, and William R. Connole will not stay on past June 22 (p. 66).

Hearings on TBA marketing divorcement bills have been delayed until June 28. This is so near end of session hearing is largely a formality. Major oil companies, however, made such effective presentations before the Roosevelt committee a short time back they are planning to appear to voice opposition to the legislation.

There is virtually no possibility that crude import levels will be reduced this year. Interior already has set quotas for the last 6 months and doesn't have the flexibility to make interim changes that it has in the residual fuel import program. Furthermore, it is tied by presidential proclamation to an over-all level of 9% of refinery runs.

That fuels study likely will be made by an existing congressional committee rather than by a special one the coal industry had sought (p. 66).

Market Memo

June 13, 1960

Vacationers are on the move—in cars, boats, trains, and planes—boosting gasoline demand.

Firming spot prices are advancing posted prices, and tank-wagon price increases are following. This improved price structure has been brought about by inter-refinery buying of gasoline and No. 2, building a solid current strength under refinery prices.

The real clincher was the 2.5-cent per gallon advance in tank wagon prices announced by Indiana Standard.

Group 3 Northern shipment of 91-RON gasoline has increased in posting to 11.25 cents per gallon and 99-RON to a posted 14 cents per gallon.

Discounts in the face of demand are difficult to obtain.

If refinery runs are held down in Group 3 and inter-refinery demand continues, further price advances will come.

Group 3 No. 2 for northern shipment, currently posted at 7.75 cents, is expected to advance to 8 cents since refiners are holding No. 2 for higher prices.

Chicago prices are firmer at postings of 11.5 cents for 91-RON and 13.75 cents per gallon for 98-RON in a no discount market.

No. 2 in the Windy City has reacted to buying demand and the posted price of 8.50 cents per gallon is firming.

Mississippi River markets, following Group 3 price advances and firming Gulf Coast spot prices, are higher to buyers.

Gasoline at West Memphis is quoted at one-fourth to three-eighths of a cent over Gulf Coast lows with several midriver suppliers sold up into July. Current river spot prices are higher than contract prices in the river by one-half cent.

Gulf Coast prices for spot cargoes are near postings due to the sold-up position of independents.

There is doubt the historical one-quarter cent off posted prices can be bettered on this market. The independents are quoting the lows on gasoline.

No. 2 in the Gulf Coast is firm at the 8-cent price, due to refiners' holding for higher prices. One major refused one-eighth cent off posted for prompt T-2 of No. 2.

Gulf Coast No. 6, both Bunker C and low-sulfur grade, is firm at posted price of $2.10 and $2.45.

Good Wells Make Good News

June 13, 1960

Dowell engineers are reporting an unusually high ratio of successful fracturing treatments. Here are four recent examples:

- **Mobile County, Alabama** (Old Oil Well) This well was producing from both the upper Donovan from 10,829 to 10,945 feet and the lower Donovan from 11,382 to 11,394 feet. Each zone was fractured separately with Waterfrac using a total of 23,000 gallons gelled water and 80,000 pounds 20/40 sand. This was the first use of water as a frac fluid in this field. Injection was approximately 18 bpm at 4500 psi down 2½-inch tubing. Before treatment well made 19 bopd from upper zone; lower zone had been temporarily abandoned as non-productive. Two weeks after treatment, upper zone was making 120 bopd. Pump was moved to lower zone which produced 113 bopd after five-day test.

- **San Juan County, New Mexico** (New Gas Well) This well was completed into three sections of the Dakota. Each section was fractured separately. To keep costs as low as possible, Dowell used a new perforating and stage-fracturing technique: Abrasijet* was used to perforate and a retrievable bridge plug assembly was run below the tool. The frac fluid was fresh water with two pounds of sand per gallon. Slick Water additive was used to reduce friction. Injection for all stages was over 40 bpm at 2300 psi. First, the lower section was perforated and fractured with 50,000 pounds sand. Second, bridge plug was set above the lower section and the main bench was perforated and fractured with 100,000 pounds sand. Third, the bridge plug was released and reset above these perforations. Then the upper section was perforated and fractured with 100,000 pounds sand. All work was done without removing tubing from hole, saving over $4000. On test, well potentialled 13,000 mcfd and produced 5640 mcfd into the gathering line. This is at least 30 per cent better than any other well this company has in the field.

- **Ector County, West Texas** (New Oil Well) This well was completed through perforations into the San Andres at about 4390 feet. It made only a show of oil. Operator wanted an economical stimulation job. Using the Frac Guide* Dowell engineers designed this treatment: First, 1000 gallons BDA* (Breakdown Acid) were jetted against perforations. Then Sandfrac* was used. 10,000 gallons lease crude with F.L.A.* (Fluid Loss Additive) carried 20,000 pounds sand into formation. Injection was down annulus at 10 bpm. After treatment, well's rated potential was 700 bopd.

- **Grant County, Kansas** (Old Gas Well) Production from this well — completed in 1949 — had declined to 403 mcfd. The operator decided to fracture the upper part of the Hugoton since he believed most previous production had been from lower zones. A 6000-pound sand plug was used to fill up 165 feet. Then Riverfrac* was used. 94,000 gallons fresh water and 80,000 pounds sand were injected down casing at 66 bpm and 800 psi. Six months after treatment, deliverability had increased to 2253 mcfd.

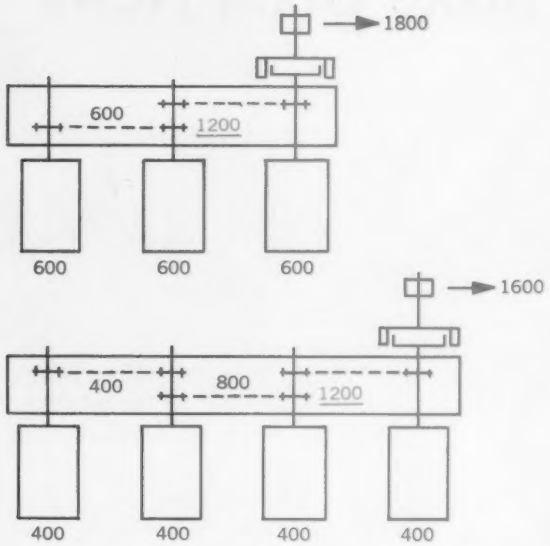
For detailed information — or for prompt service — dial Dowell. Dowell services and products are offered from more than 150 offices and stations in the United States, Canada, Venezuela and Argentina. Dowell, Tulsa 1, Oklahoma.

*DOWELL TRADEMARK

Services for the oil industry DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

How many engines for your rig ?



The answer naturally relates to the horsepower of each engine . . . but these power-flow diagrams show an interesting fact that can help you decide. Notice that three 600-hp engines in compound will load the critical compound chain no higher than four 400-hp engines; yet deliver more total power.

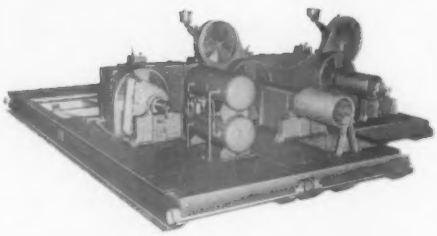
"Oilwell" Specialists can help you plan your rig for the most efficient use of power at the lowest possible cost. Their advice in the planning stage can frequently make later operations more efficient and more economical.

USS and "Oilwell" are registered trademarks

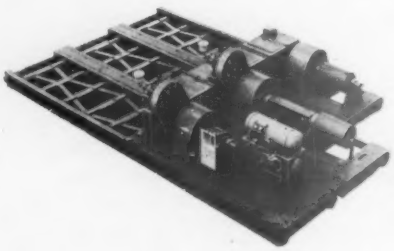
Oil Well Supply Division of United States Steel

Executive Offices: Dallas, Texas
Export Offices: 30 Rockefeller Plaza, New York 20, N. Y.

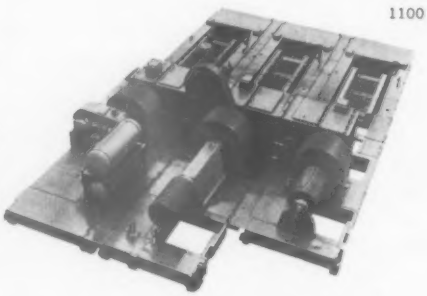
THESE "OILWELL" DRIVES are sectional for fast moving and rig-up. All include design and accessibility features which permit quick and low-cost maintenance. They can be furnished for two or more engines and can be expanded readily in the field. Fluid drives can be accommodated.



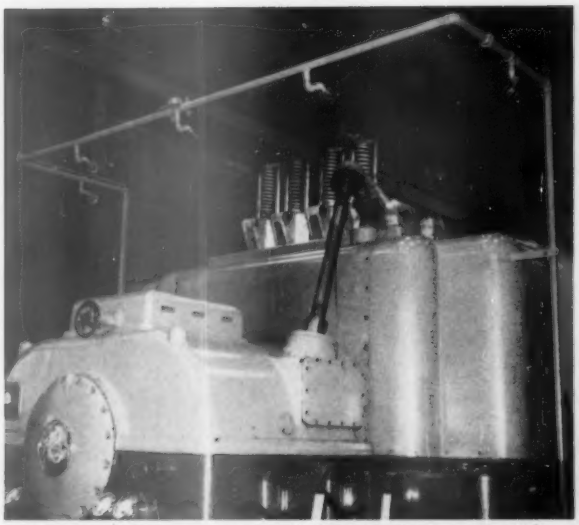
1100 DRIVE for Shallow to Deep Drilling. 1¼-inch Quadruple Chain



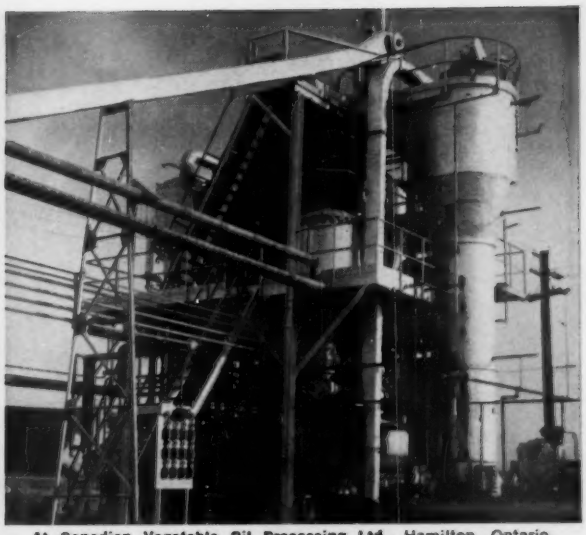
1600 DRIVE for Medium to Deep Drilling. 1½-inch Quadruple Chain



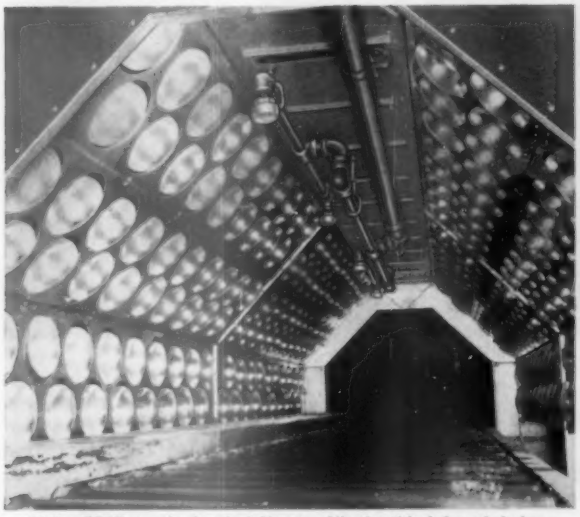
2200 DRIVE for Deepest Drilling. 1½-inch Sextuple Chain



At Pennsylvania Power and Light Company, Sunbury, Pa., this steam generator is protected by an automatic Grinnell Protecto-Spray system in the event of outside fires and by a Dry Chemical system inside the casing.



At Canadian Vegetable Oil Processing Ltd., Hamilton, Ontario, Grinnell ProtectoSpray safeguards upper structure of this hexane solvent extraction unit, while a ProtectoFoam system guards the lower section.



At the RCAF supply depot at Namao, Alberta, this infrared drying oven is protected by a Dry Chemical system engineered by Grinnell to protect against possible fire resulting from ignition of flammable vapor mixtures.

At Dresser Industries, Inc., Dallas, Texas, hot metal temporarily ignites resulting vapors as metal is being submerged. If fire should get out of control, a Grinnell-installed Carbon Dioxide system is on guard to extinguish it quickly.

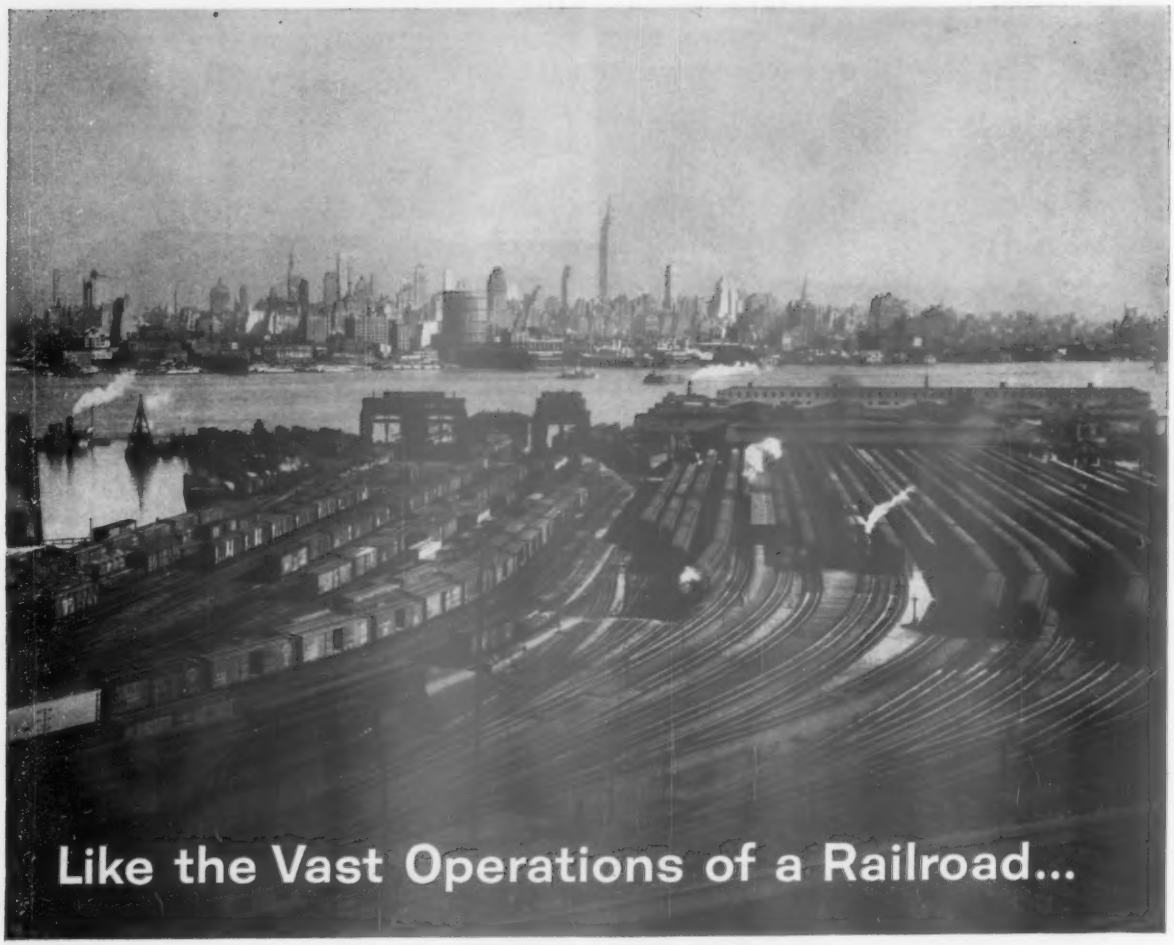
You can rely on Grinnell for the right protection against destruction by fire!

Grinnell has had 90 years experience in devising fire protection systems for all kinds of fire hazards — systems which can be relied on to protect the continuity of your business and to safeguard your dollar investment. Grinnell offers you quality-controlled manufacturing, layouts by experienced engineers, and installations by skilled crews. Let Grinnell engineers help you select the right system.

16 mm. Sound-Color Film—Get up to date on fire with Grinnell's 35-minute film — "Fire Protection Through Research." Both typical and unusual fire hazards are described and demonstrated. To borrow this film, without charge, write — Grinnell Company, Providence 1, Rhode Island.

GRINNELL

FIRE PROTECTION SYSTEMS SINCE 1870



there's more to Cities Service than meets the eye!

Railroads cover the country with a complex web of tracks. New York is served by 14 different lines . . . Chicago by 33 . . . Detroit by 10. Railroads have always played a vital part in the growth and prosperity of our cities and towns.

America has 394,804 miles of railroad track serving 412 million passengers and transporting more than 2,500,000,000 tons of freight every year. It takes more than one million railroad employees to perform this enormous task.

But few people realize all that stands behind modern railroad transportation.

Likewise, few motorists pulling into their local Cities Service station think of the vast network of people and facilities behind that tankful of gasolene. It takes Cities Service drilling crews in four continents, thousands of miles of pipelines, huge refineries and modern research laboratories to produce gasolene.

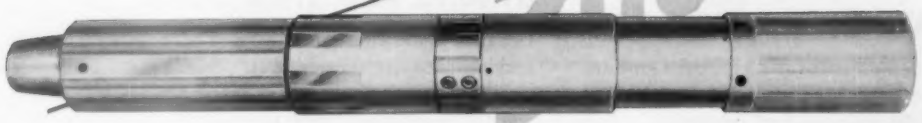
And it takes investment . . . over a billion dollars so far to build and maintain these modern Cities Service facilities.

Only in this way can America have what it needs for progress —more jobs and more and better oil products.

CITIES SERVICE

CITIES SERVICE COMPANY 50th ANNIVERSARY

PERFECT PERFORMANCE 200,000 TIMES



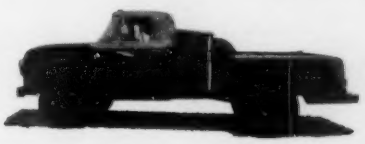
Formation testing record books have *all* had to be rewritten since Halliburton introduced the Hydro-Spring Tester. The Tester set an unprecedented pace by completing its first 20,000 jobs WITHOUT A SINGLE MIS-RUN traceable to the tool . . . and in the hundreds of thousands of jobs run since that time, mis-runs due to Hydro-Spring Tester Tool failures have amounted to less than *one-tenth* of one per cent!

This is the kind of performance record that puts *real meaning* in the statement . . . "For testing results you can trust . . . trust Halliburton."

THIRTY SECOND TECHNICAL SUMMARY

The Hydro-Spring Tester is basically a combination tool consisting of a locked open by-pass valve and tester valve. The by-pass valve remains open going in the hole until weight is applied on the drill string to set the testing packer. The tester valve opens after a definite time interval following the closing of the by-pass valve and expansion of the packer. This makes possible an accurate reading of the initial hydrostatic mud weight. Positive indication is given at the surface when the tool opens.

The proven design and simple construction of the Hydro-Spring Tester share the primary responsibility for the tool's overwhelming success. Call on this winning team for your next formation testing operation.



"FOR TESTING RESULTS YOU CAN TRUST"

HALLIBURTON TESTING SERVICES

HALLIBURTON OIL WELL CEMENTING COMPANY - DUNCAN, OKLAHOMA

engine power BY CATERPILLAR

UP GO HORSEPOWER

Turbocharging plus aftercooling now mean even more engine

Add a turbocharger and aftercooler to Cat Natural Gas Engines and you get 90 more horsepower on the G397 . . . now rated at 560 HP. You get 70 added HP from the G375, or a total of 380. The Cat G342—industry pacesetter for low operating cost and low purchase price—is up from 235 to 280 HP. All ratings are *continuous*. And remember, you don't derate Cat Natural Gas Engines. They're built for tough diesel service, then modified for lighter gaseous fuels.

WHY NO DERATING

You may remember when all naturally aspirated engines —diesel *and* gas—were derated to 65%-80% when they were converted to gaseous-fuel operation. And with good reason. But Caterpillar's investment of years of study, millions of research dollars and, the technological advances in materials and technique that have resulted, make derating no longer necessary.

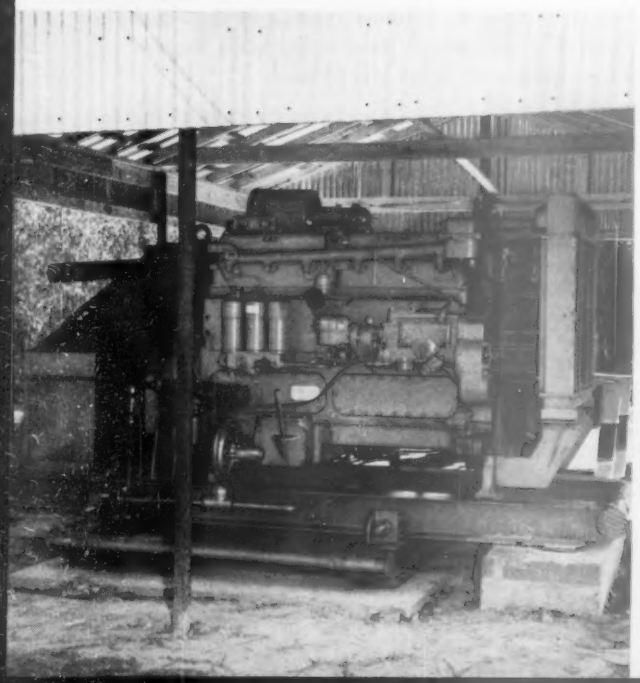
Even today, engines employing soft crankshafts and bearings, with only medium load carrying ability, must still be coddled when you talk rating.

Cat Diesels, for instance, proved that they could carry the load under 15:1 compression ratio with a manifold pressure of 55 inches of mercury (absolute). Natural gas engines have less demanding compression ratios and a manifold pressure of roughly half that for diesels—or about 28 inches of mercury (absolute). You can see from this that Caterpillar bearings are well under load design limits for natural gas service.

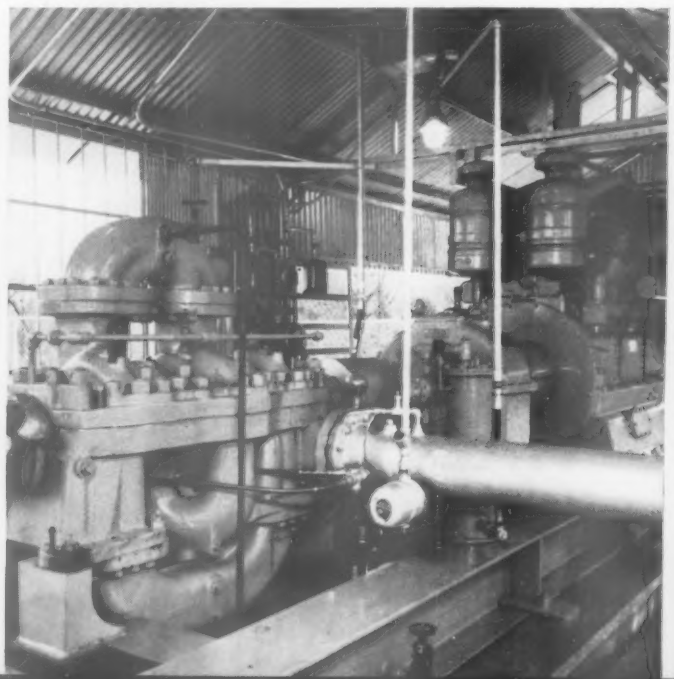
STRONG AND THEN SOME

Because Caterpillar puts a wide margin of safety and service into its diesels, you have a lot of insurance against stress in the natural gas version. Heat treating, special machining, and the materials we use in our crankshafts and bearings are just 3 reasons for this added stamina. For instance, in cranks we use a selected alloy steel, processed to our specifications. We harden journals to Shore 54-62, approximately .150 inch deep, and superfinish them with microhoning. All fillets have large radii and are carefully ground and polished. We statically *and* dynamically balance *all*

Vanson Production Corporation chose a G342 to power this 8¼ x 13 Worthington compressor, upon recommendation and engineering data furnished by the fabricator, Ingersoll Mfg. Co., Inc., of Shreveport, Louisiana.



This G397 powers an Ingersoll-Rand pump at Tyler, Texas, for Texas Eastern Transmission Corporation. The unit pumps 1000 barrels per hour of kerosene, fuel oil, gasoline and jet fuel from Tyler to Carthage, Texas, and on to the "Little Big Inch" pipeline.



RATINGS FOR CAT NATURAL GAS ENGINES

when you specify a Cat Natural Gas Engine. And they're still the world's lowest cost power producers...

crankshafts to smooth away vibration. Torsional vibration dampers reduce torsion stresses to low levels.

CONSTANT IMPROVEMENT

Over ten years ago, we proved that babbitt hadn't the heart for carrying the load in then-current diesels. Neither did copper-lead. Our solution was aluminum bearing materials which resulted in bearings that some experts call the most successful on the market today.

We do even more to build-in staying power. Cylinder liners are full length and water cooled. They're "Hi-Electro" hardened to a depth of approximately .060 inch to a Rockwell C47-55. Permanent mold aluminum pistons that have a wear-resistant, cast-in iron top ring band are used in Cat Engines. The oil-jet cooling on the underside of the piston head and the piston design itself are made for the rigors of diesel rather than the less strenuous natural gas use.

EITHER WAY YOU CHOOSE

The net result of all of Caterpillar's extra design and construction is a natural gas engine of exceptional performance ability. Not only is it the most engine . . . it's the most value. Cat Natural Gas Engines are the world's lowest cost power producers. No matter how you buy—on price or performance—your best buy is Caterpillar. We realize we can't answer all of your questions in just this space, nor can we provide all of the information you need in order to completely evaluate Cat Natural Gas Engines for your oilfield work. Write us for a copy of "Cat Natural Gas Engines." Or, if you would prefer, call in your Caterpillar Dealer before you buy your next engine. Remember, too, to specify Cat power in new oilfield equipment.

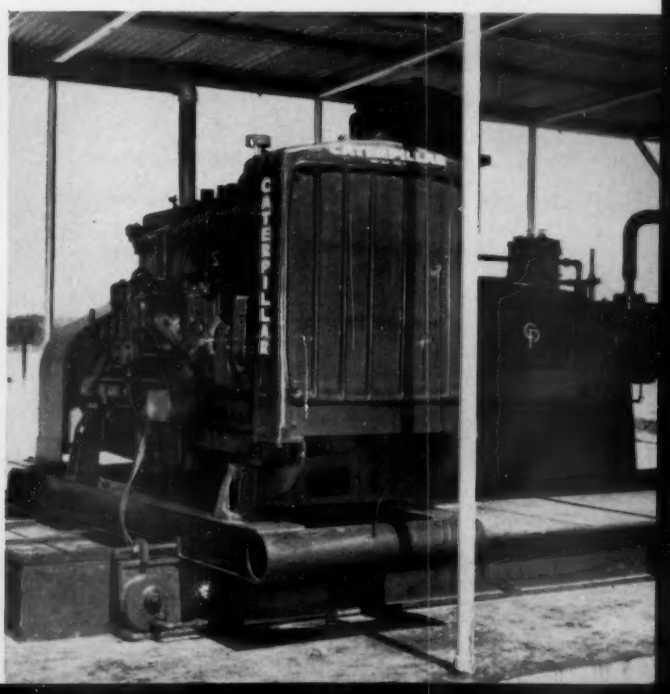
CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

Engine Division, Caterpillar Tractor Co., Peoria, Ill., U. S. A.

A Caterpillar Natural Gas G342 handles 1,500,000 cubic feet of natural gas per twenty-four hours at booster station operated by Texkan Oil Co., near Alice, Texas. The 7.5:1 compression ratio pistons were selected for operation on available field gases.

Northern Pump Co. of Minneapolis, Minn., powers a Chicago Pneumatic compressor with this Caterpillar G342. This unit puts 1¼ million cubic feet per twenty-four hours of excess gas from four producing wells into an injection well near Beeville, Texas.



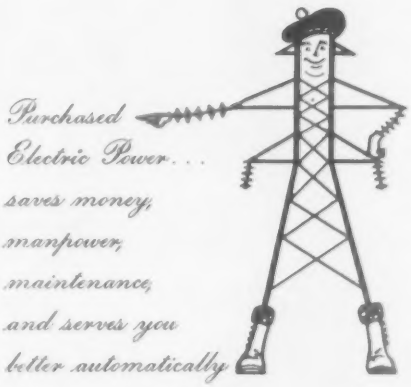
You can depend on purchased electric power for

MONEY SAVING

This mainline crude oil station was converted to purchased electric power.

Typical of money saving installations is this new crude station using utility electric power

This modern station using three 500 hp and two 150 hp motors and 22 electrically operated valves is evidence of the trend to purchased electric power for ultimate economy. Whether your operation is pipeline, refinery or production it will pay you to investigate the possible savings of utility electric power. Call your nearest utility electric power company today.



Petroleum Electric Power Association

P. O. BOX 35006, DALLAS 35, TEXAS

Specify
CONTINENTAL SUCKER RODS
and get
C-E customer service . .
as important as the steel
in the rod

In this day of *tighter profits,* it pays to look beyond the type of steel or grade of rod . . and view the service and facilities behind the sucker rods you buy. *Profit conscious* companies are doing just that . . directing their personnel to specify Continental sucker rods and couplings. And here's why . .

Continental-Emsco service cuts pulling costs

. . let a Continental-Emsco Production Specialist have your well fluid or sucker rod failure analyzed. Through Continental-Emsco's metallurgical facilities, he can determine the corrosive content of the fluid . . spot the cause of the rod failure . . and recommend the *right* rod for the longest possible pumping . . *this C-E service costs nothing extra!*

Continental-Emsco service reduces your engineering costs

. . plant trained C-E men can engineer an optimum rod string for minimum weight and the lowest possible stress

on top rods, unit pumper and prime mover.
This service relieves the work load of your engineering department while providing you with the experience and knowledge of men that are specialists in this field of engineering . . *another C-E service that costs nothing extra!*

Continental-Emsco *service reduces your operating costs*

. . C-E specialists are fully trained and qualified to make a dynamometer analysis of your wells.
Their recommendations will help eliminate many of the causes of sucker rod failure . . and guide you in proper counterbalancing to (1) cut power costs and (2) reduce wear on equipment. *This C-E service, too, costs nothing extra!*

Continental-Emsco *service extends equipment life*

. . C-E specialists are always available to train your crews in the right way to handle sucker rods and other subsurface equipment in the field for maximum life . . *additional C-E service that costs nothing extra!*

Are you pulling too many wells.. because you're buying steel alone?

CONTINENTAL-EMSCO

Serving the Oil and Gas Industries ... Worldwide

Any

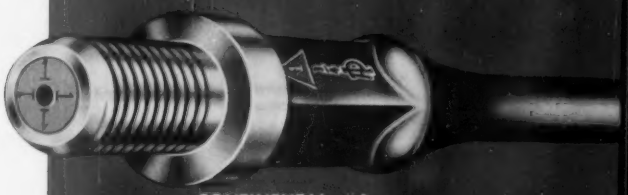
JMSR 020

You can always depend upon Continental Sucker Rods

...nywhere in the world

Continental-Emsco, a fully integrated supply company, is able to maintain constant quality control of Continental sucker rods from raw ore to your well.
Close liaison is maintained with the parent company, The Youngstown Sheet and Tube Company, to assure steels of uniform quality, reflecting the latest improvements developed through continuous metallurgical research.
C-E's sucker rod plant operates under rigid quality control standards.
Wholly-owned supply stores and exclusive representatives throughout the world provide Continental-Emsco quality . . regardless of where you're producing.

For maximum performance . . maximum service . . Specify Continental sucker rods



CONTINENTAL #1

An economical rod with tremendous carrying power in noncorrosive wells or where an inhibitor is used . . yield strength range 60-75,000 psi.

CONTINENTAL #5

A medium priced rod with an amazing performance record, primarily due to corrosion, which gives it a strength equalling many so-called "high tensile" rods . . yield strength range 71-95,000 psi.

CONTINENTAL #8

The new Continental #8 rod is priced lower than Continental's premium #10. It offers a moderate degree of corrosion resistance plus top load capacity . . typical yield strength 113,000 psi.

CONTINENTAL #10

The premium quality of this rod results in exceptionally long pumping life in deep, problem and hard pumping wells, where its high ductility and corrosion resistance pay off . . yield strength range 95-110,000 psi.

CONTINENTAL #11

The finest rod in the Continental line, the low carbon and high nickel content provides high load carrying capacity in corrosive wells . . yield strength range 90-105,000 psi.

CONTINENTAL-EMSCO

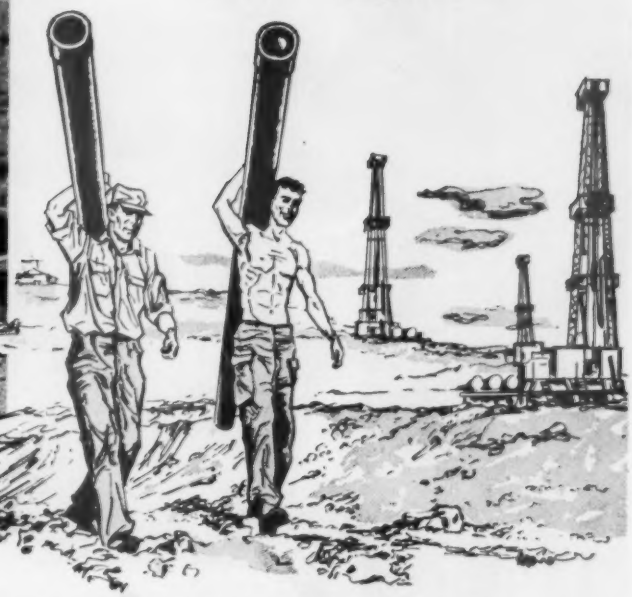
Serving the Oil and Gas Industries ... Worldwide

CONTINENTAL-EMSCO COMPANY • A Division of The Youngstown Sheet and
Export Division: 30 Rockefeller Plaza, New York, N. Y. • Continental-Emsco Company Ltd.
Continental-Emsco Company C. A., Caracas, Venezuela • Plants: Houston and Garland, Texas; St. Albans, Herts, England •

TROUBLE-FREE TRANSMISSION OF SALT WATER AND WASTE...

RIGID PIPE

made of ***ABS*** *Plastic*



RIGID PIPE OIL FIELD INSTALLATIONS OFFER NEW PROOF OF SUPERIORITY OVER CONVENTIONAL TYPE

BE *ABSolutely* SURE . . .
INSIST ON RIGID ABS PIPE
made of
CYCOLAC®
THE BORG-WARNER PLASTIC THAT IS TOUGH, HARD AND CORROSION-RESISTANT

- ★ Ideal for salt water tubing
- ★ For salt water disposal lines
- ★ For salt water gathering lines
- ★ For fresh water lines on leases
- ★ Carries sour crude safely
- ★ Handles all water flooding jobs

In Texas, Oklahoma, Kansas and Illinois—wherever oil is produced—ABS plastic pipe lines made of CYCOLAC are now on the job! Oil men have discovered that chemically-resistant, corrosion-free rigid ABS cuts both costs and man-hours. Rigid pipe is easily carried and quickly connected—two men can install over six miles in a day! Once installed, its smooth interior walls reduce friction and deliver more liquid, size for size.

Write for the name of your nearest supplier

MARBON CHEMICAL
WASHINGTON

MARBON CHEMICAL
BW
BORG-WARNER

DIVISION **BORG-WARNER**
WEST VIRGINIA

"What kind of Pumping Control do YOU need?"

Square D can deliver it from Stock!

BASIC PANEL can be tailored to fit your needs—

- NEMA Type 3 "weatherproof" enclosure protects against rain, sleet, hail, snow and dust.
- simplified installation—convenient knockouts for easy wiring, designed for either wall or pole mounting, or available with pedestal mounting feet if desired
- oversized enclosure permits field installation of additional features if required
- choice of fusible disconnect switch or circuit breaker
- HAND-OFF-AUTO selector switch
- available in ratings up to NEMA Size 4 to handle up to 100 hp

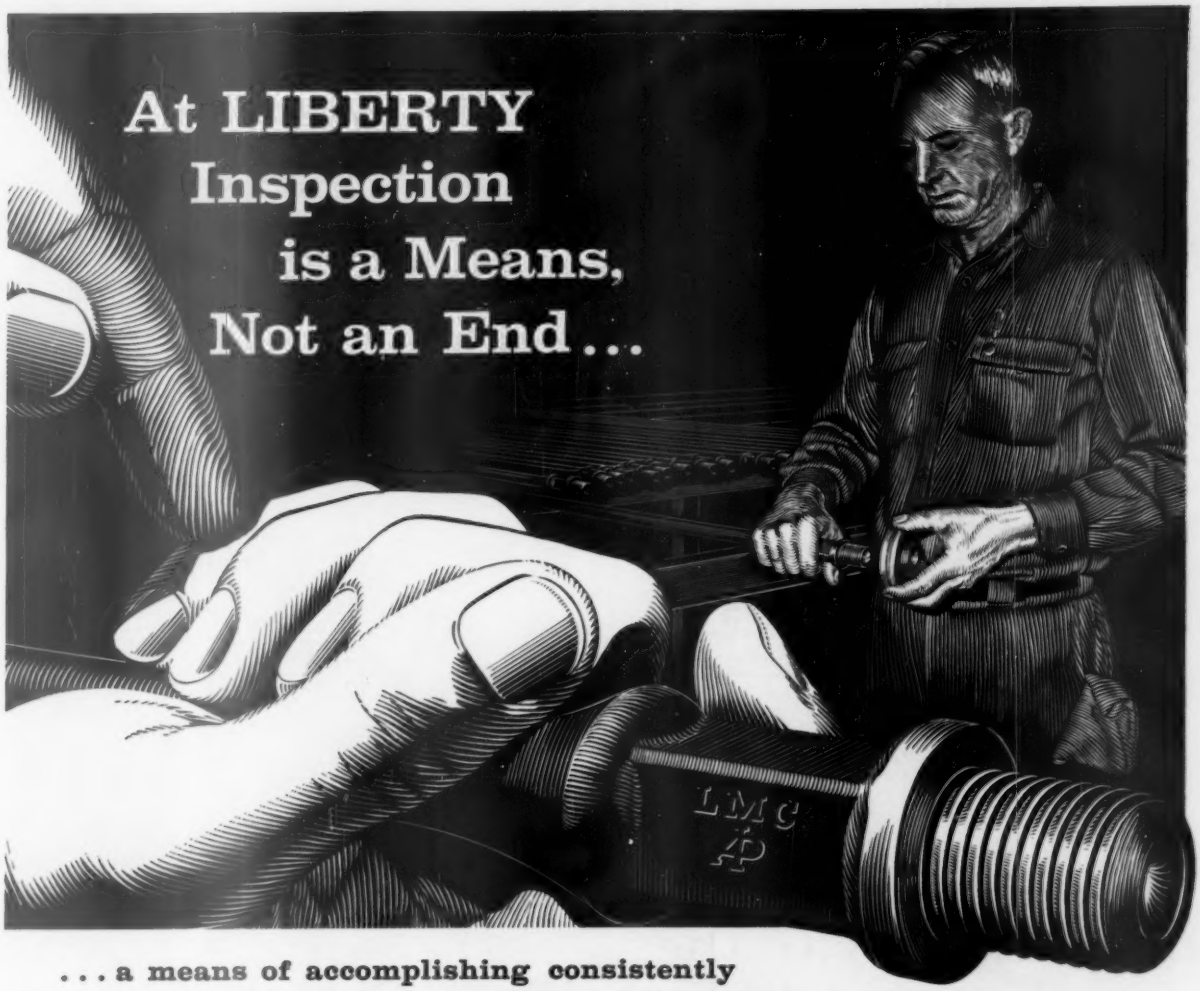
COMPLETE PROGRAMMING PANEL has every feature you need for oil well pumping—

- two types—one for operation up to 600 volts, another for 762-volt systems
- gasketed inner door isolates "live" parts—NEMA Type 3 enclosure gives complete weather protection
- overload relays in separate ventilated compartment to prevent nuisance tripping
- time clock has trip tabs for easy pumping program setup
- undervoltage release relay drops out on power failure, provides time-delay restart for staggered starting when power is restored
- built-in lightning arrester

Write for Bulletin 8944. Square D Company, 4041 North Richards Street, Milwaukee 12, Wis.

SQUARE D COMPANY

—wherever electricity is distributed and controlled



...a means of accomplishing consistently fine quality and perfect uniformity.

Inspection is one of the vital steps in the quality control program at LIBERTY MANUFACTURING COMPANY of Texas, but it is only one phase in a well integrated and co-ordinated operation. The end objective, and one kept constantly in mind during every stage of manufacture, is delivery to the well site of the finest sucker rods that advanced design engineering and metallurgy can produce.

Inspection does play a vital role in maintaining uniformity of product and, consequently, uniformity of performance. That is why LIBERTY exercises 100% inspection of every sucker rod and coupling. Every LIBERTY Sucker Rod is A.P.I. gauged. This is the most rigid inspection in the industry. Producers, from the smallest independent to the largest major, have learned that they can rely on LIBERTY Sucker Rods to perform as specified. For at LIBERTY, the goal is not to produce the most sucker rods in the least time, but to produce the finest sucker rods...regardless of time!

FOR EXCELLENT PRODUCTS AND SERVICE
SPECIFY LIBERTY SUCKER RODS AND PUMPING UNITS

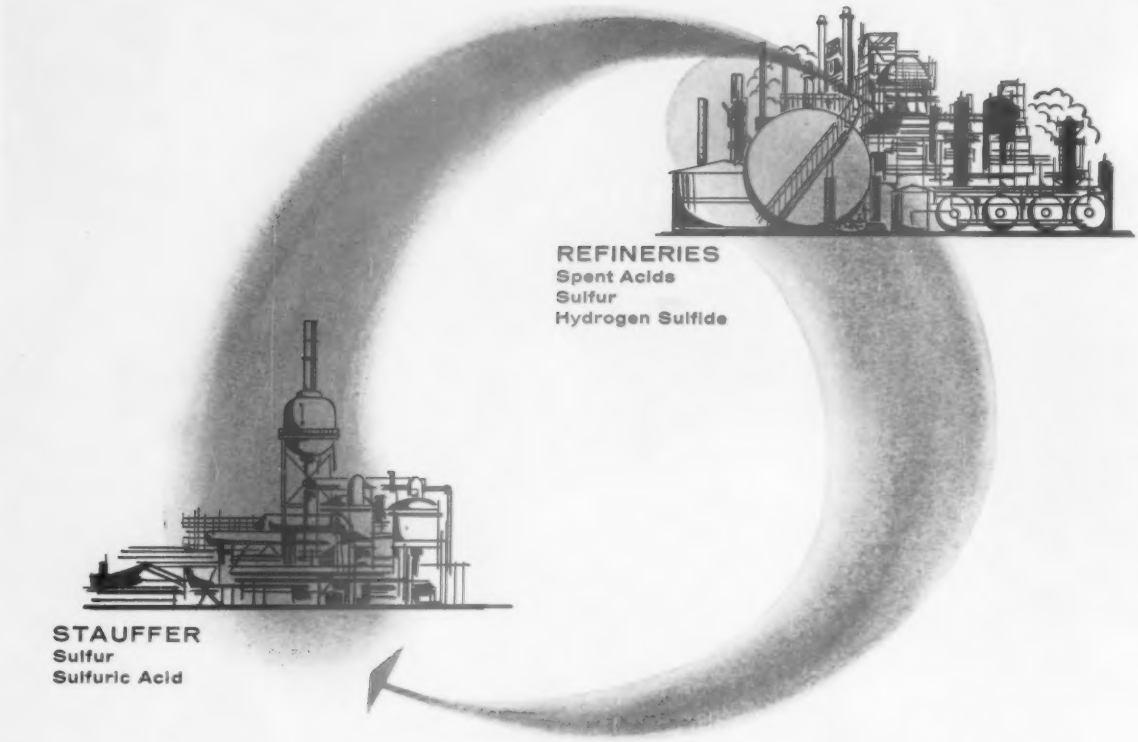
• SOLD ONLY THROUGH SUPPLY STORES •

LIBERTY

MANUFACTURING COMPANY OF TEXAS

4025 HEMPHILL STREET • FORT WORTH, TEXAS

LM-8



Stauffer is the Key to the Sulfuric Acid-Petroleum Cycle!

There is a steady flow of sulfuric acid in Stauffer's large fleet of carriers from our sulfuric acid plants to refineries throughout the country.

Similarly, there is a steady flow of raw and waste materials and sulfur by-products from refineries to our regeneration plants for conversion to water-white sulfuric acid of any specified concentration.

Stauffer's sulfuric acid regeneration plants are located in Texas, Louisiana, Indiana and California; in some cases adjacent to refineries for pipeline exchange of materials.

Rigid day-to-day traffic control of tank trucks, tank cars and barges assures scheduled deliveries.

Stauffer also supplies the petroleum industry with aluminum sulfate, caustic soda, muriatic acid, metal chloride catalysts, sulfur chlorides and numerous phosphorus compounds.

Stauffer CHEMICALS SINCE 1885

STAUFFER CHEMICAL COMPANY

380 Madison Avenue, New York 17, New York

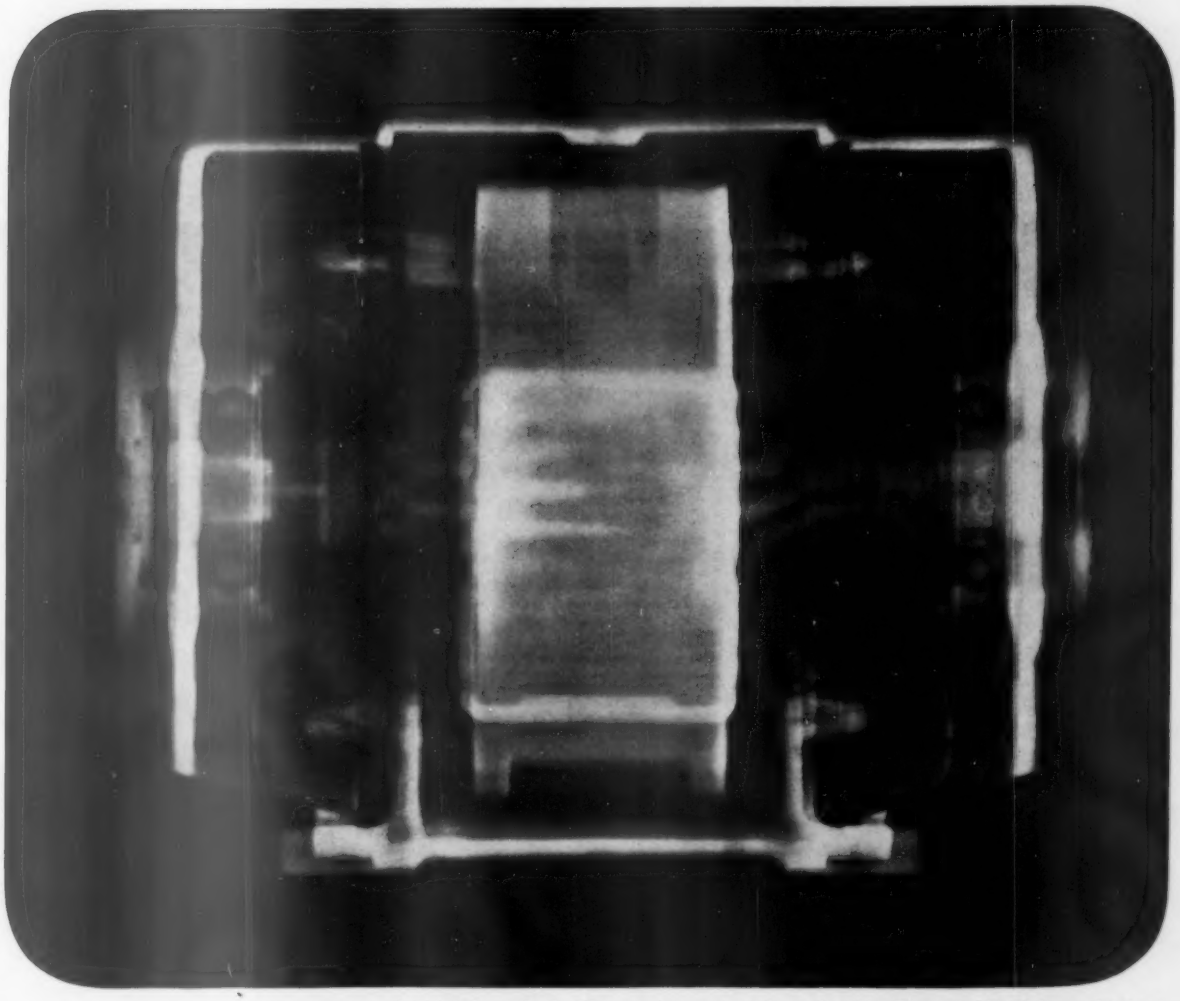
Chicago 1, Prudential Plaza / San Francisco 8, 636 California Street
Los Angeles 17, 824 Wilshire Blvd. / No. Portland, Ore., Suttle Rd.
Akron 8, 326 South Main Street

75 YEARS OF SERVICE TO INDUSTRY AND AGRICULTURE 1880 1955

CONSOLIDATED CHEMICAL INDUSTRIES DIVISION, 6910 Fannin Street, Houston 25, Texas

ALLIS-CHALMERS

A-1337



Actual radiograph of a 5-hp open-type motor taken with a 24-million volt Allis-Chalmers Betatron.

X-ray view of motor health

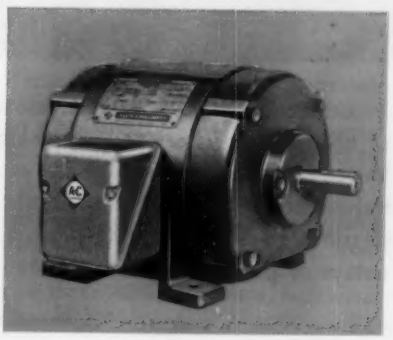
Invisible standards of perfection increase life expectancy of every Allis-Chalmers motor

The exceptionally long performance of A-C open motors proves the value of thinking *beyond* established standards of design . . . of taking "significant new achievement" as the ideal.

This ideal led to many refinements for A-C open motors: double-shielded bearings that keep dirt out and allow controlled migration of grease, permanently numbered lead spacer and leads for easy identification and connection, and heavy-duty cast iron frames that resist corrosion and keep rotating parts perfectly aligned.

For totally-enclosed, open-type and *Super-Seal* general purpose motors, and electrically or mechanically modified definite-purpose motors, choose the motor built to invisible standards of perfection. Choose A-C. Special application help available.

Call your nearby A-C representative. Or write **Allis-Chalmers,** *Industrial Equipment Division, Milwaukee 1, Wis.* Super-Seal is an Allis-Chalmers trademark.



POWELL
giant in-stock valve supply for quick delivery

Powell maintains one of the largest in-stock supplies of bronze, iron, steel and corrosion resistant alloy valves in the world. So you can receive immediate valve delivery from Powell's factories or your nearby distributor's stocks and avoid costly operational delays or plant shutdowns.

For quick action, just pick up your phone and contact your local Powell Valve distributor or The Wm. Powell Company direct. With our 114 years of valve manufacturing experience, we can fill your valve needs and solve your valve problems! Let us hear from YOU—TODAY!

THE WM. POWELL COMPANY DEPENDABLE VALVES SINCE 1846 CINCINNATI 22, OHIO **world's largest family of valves**

ALLIS-CHALMERS

Imagine! A package this small

contains the spare parts for your Ro-Flo compressor

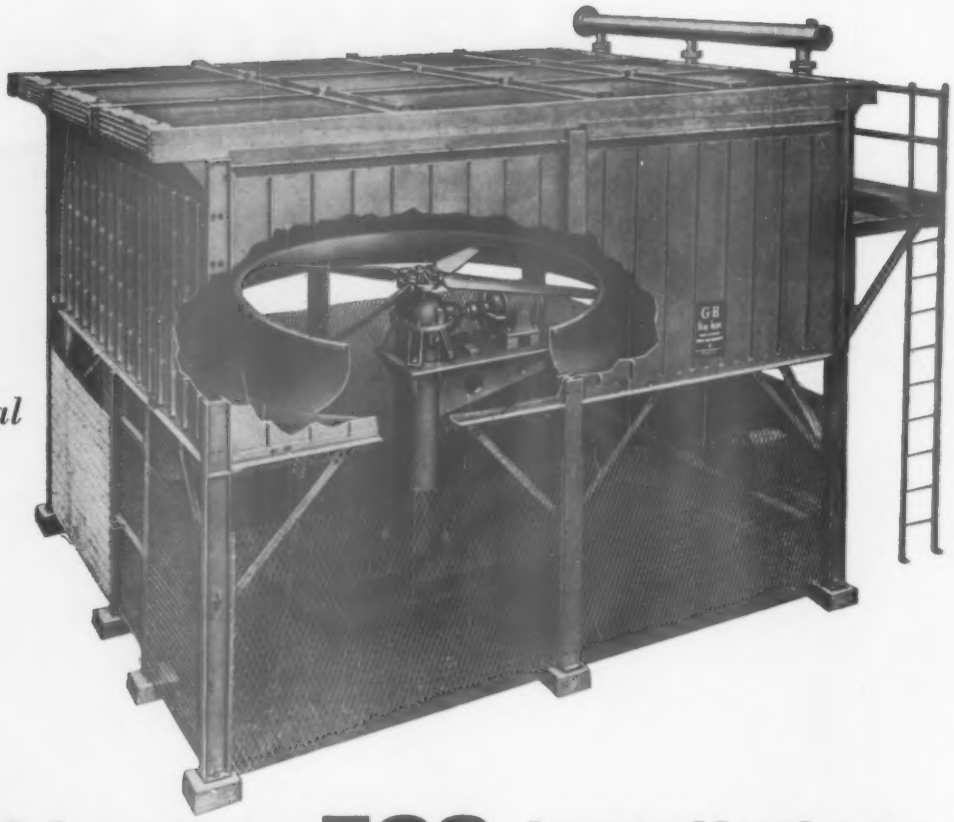
A spare parts kit you can hold in your hand — dramatic evidence of the continuous, trouble-free performance that is yours with a *Ro-Flo* compressor.

You need fewer spare parts because there are fewer moving parts to wear out. No pistons, no valves, no connecting rods. Besides the bearings and seals, which all units have, only the rotor blades are exposed to normal wear, and rotary design compensates for it — automatically, by centrifugal force. Average blade life is two to three years, and when finally worn, blades can be replaced in one simple operation.

Smooth rotary motion of the *Ro-Flo* compressor eliminates the vibration and pounding shock of reciprocating units — and the necessity for expensive, heavy foundations. A slab is enough. Smaller units can be mounted directly to the floor.

Two-stage *Ro-Flo* compressors are built in twelve sizes to handle from 250 to 1800 cfm at pressures from 60 to 125 psig. Single-stage units up to 50 psig, from 40 to 3000 cfm. *Ask your A-C representative for descriptive literature, or write* **Allis-Chalmers,** *Industrial Equipment Division, Milwaukee 1, Wisconsin.* A-1270

Designed for the Petrochemical Industry



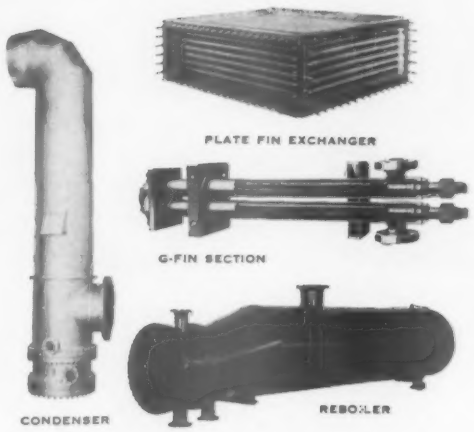
Proved in over 500 installations

Griscom-Russell fin-fans, by eliminating the cost of water, pumps, piping, valves, water treatment and maintenance, are the economical heat exchangers for many petrochemical cooling and condensing services.

G-R **fin-fans** are designed of the highest quality components to fit your special application. The transfer area is made of G-R's strong, helically finned tubing for highest efficiencies. Exceptional design and pre-fabricated construction minimize installation and maintenance expenses.

fin-fans are available in forced or induced draft designs with a wide range of capacities. Many accessories are available to solve special drive, control and weather problems.

Send for Griscom-Russell Bulletin 2400.



G-R Designed for the Petrochemical Field

Reboilers • G-Fin Sections • Condensers • Plate Fin Exchangers • Longitudinally and Helically Finned Tubing • Bentube Evaporators • Liquid Heaters • Tubular Heat Exchangers • Solution Heaters • Oil and Water Coolers • Tank Heaters • Gas Coolers • Bentube Sections

THE GRISCOM-RUSSELL CO.

MASSILLON, OHIO

A SUBSIDIARY OF **HAMILTON-THOMAS CORP.**

HEAT EXCHANGE EQUIPMENT
FOR THE PETROCHEMICAL INDUSTRY

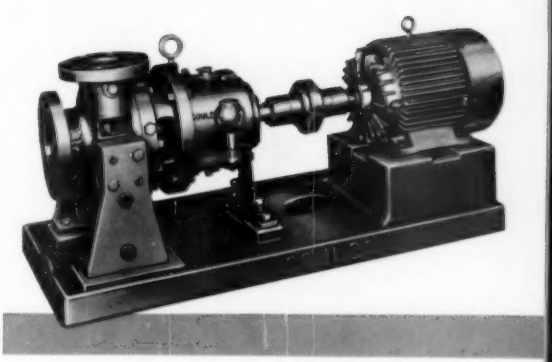
GR 300

200° to 650° REFLECTIONS ON THE INTERMEDIATE-RANGE

A petroleum pumping problem lies between the temperatures of 200° and 650°F—the intermediate range. Pumps that handle these temperatures are usually built to stand far greater heat . . . and are much more pump than is needed.

Goulds has designed a petroleum process pump that fits into this critical area of temperatures like a glove . . . by adding one hundred twelve years of experience to a young and vigorous talent for matching the pump to the problem.

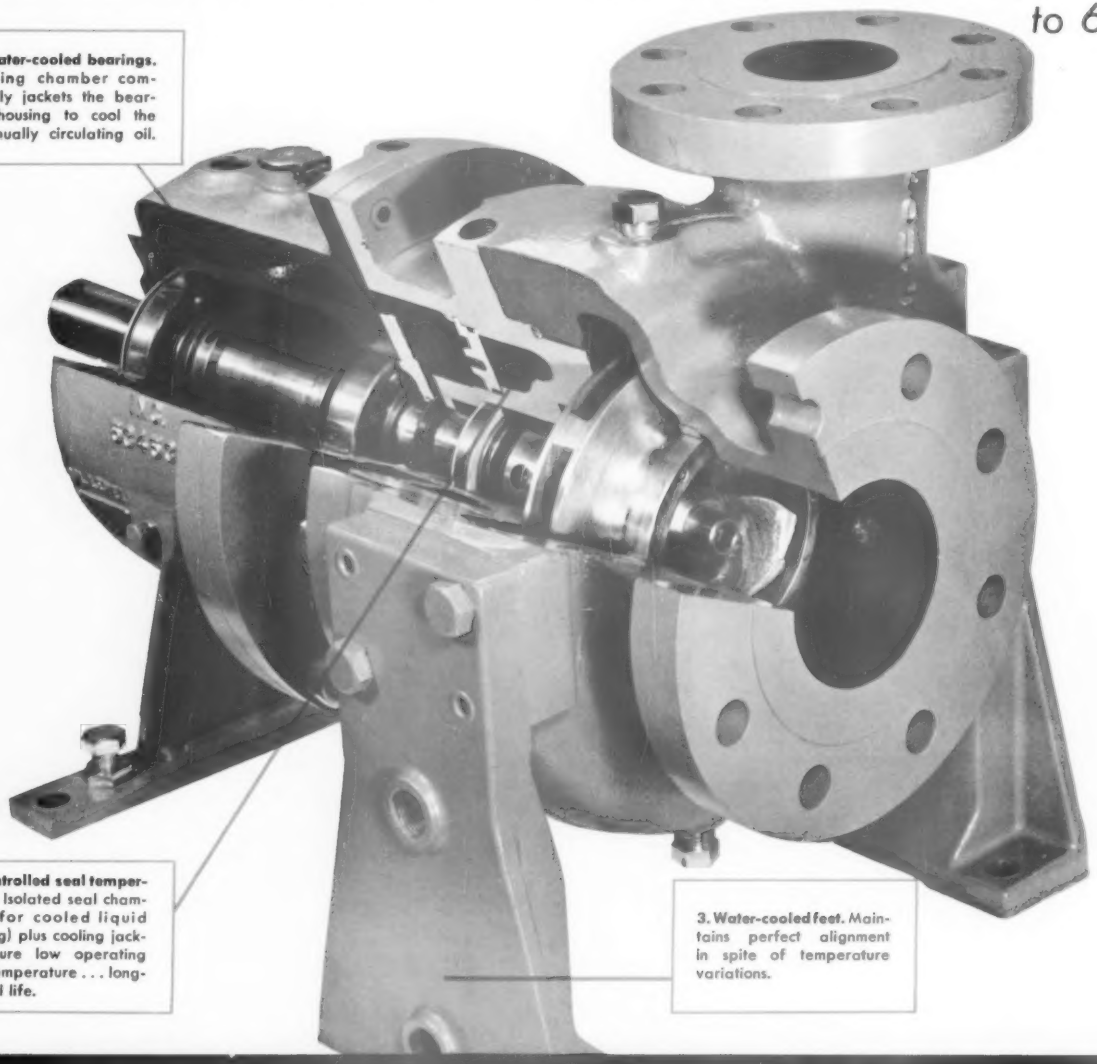
When you turn this page, you'll see inside the intermediate-range pump. And you'll get a glimpse of other Goulds pumps planned with the petroleum industry in mind.



AN INSIDE LOOK AT
INTERMEDIATE-RANGE DESIGN

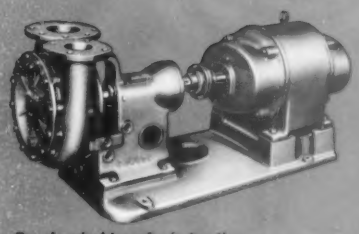
Here's why the Goulds petroleum process pump handles temperatures to 650°F

1. Water-cooled bearings. Cooling chamber completely jackets the bearing housing to cool the continually circulating oil.

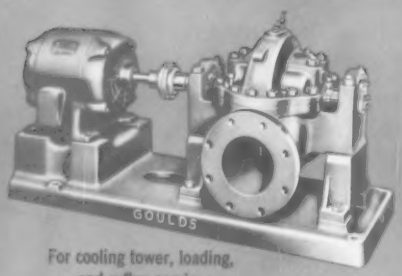


2. Controlled seal temperature. Isolated seal chamber (for cooled liquid flushing) plus cooling jacket insure low operating seal temperature . . . longer seal life.

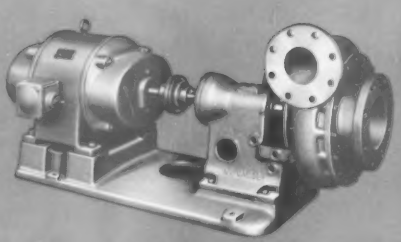
3. Water-cooled feet. Maintains perfect alignment in spite of temperature variations.



For chemical transfer in treating and lube plants



For cooling tower, loading, and reflux service



For tank farm and bulk service

Intermediate-range design lowers initial cost

Practical features cut maintenance cost

Goulds petroleum process pump Model 3775, built to API 610 specifications, gives you the economies of practical design.

Back pull-out makes seal replacement and maintenance easy. With the use of a spacer coupling, rotating parts can be removed without disturbing pipe connections or drive. *A millwright can do it alone.*

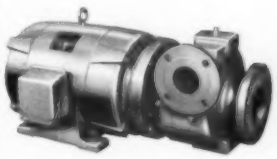
Choose your own seal design. Single, double, balanced or unbalanced mechanical seals can be supplied to suit your specific requirements.

Low spare parts inventory. All eleven sizes of the Model 3775 are built on the same bearing frame. The resultant standardization and interchangeability give you maximum economy in inventorying spare parts.

High working pressures. The Model 3775 has been designed expressly to meet the exacting requirements of the petroleum and petrochemical industries. It is an enclosed impeller-type centrifugal pump, centerline mounted with vertically split casing. It pumps a maximum of 850 gpm, handles pressures to 550 psi.

For complete specifications, construction details, and pressure-temperature chart, just send us the coupon below.

Close-coupled version



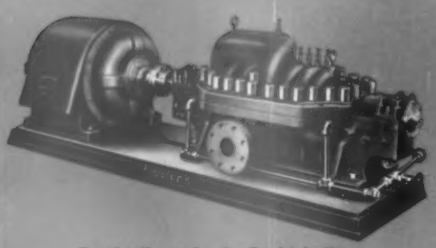
Goulds Model 3675 is a close-coupled version of the Model 3775, incorporating the same liquid end as the frame-mounted type but providing the compactness found only with integral pump-motor designs. Eleven sizes provide broad rating coverage with capacities to 850 gpm, heads to 350 ft. Maximum temperature is 275°F and maximum working pressure 550 psi.

The Model 3775 serves a broad range of applications

LOW TEMPERATURES. Low-temperature applications are met equally as well as high-temperature ones. Shown above is a 3775 1½x2-9 on propane-circulating service rated at 70 gpm, 210 ft, 10°F liquid. Compact casing design with internal seal flushing provides for easy lagging.

HIGH TEMPERATURES. Intermediate-range design provides a standard pump for the higher-temperature applications. Shown above is a 3775 3x4-7 on hot oil service handling 250 gpm against 130 ft. of head of 400°F oil. Bearing cooling and seal chamber cooling, standard features on these pumps, provide the essential features necessary for this engineered application.

NORMAL SERVICE. Where the need is for steel case and high working pressures, as on light ends, reflux, and intercooler service, Goulds Model 3775 is ideally suited. Shown above is a typical service handled by a pair of 2x3-7 pumps rated 150 gpm at 150 ft, propane at 100°F and 200 psi suction pressure.



For pipe line and water flood injection

For corrosives, slurries, and waste

GOULDS PUMPS, INC.

Dept. I R-60, Seneca Falls, N.Y.

Please send me Bulletin 724.1 giving details and specifications on the Model 3775.

NAME..... TITLE.....

COMPANY.....

ADDRESS.....

CITY..... ZONE..... STATE.....

To produce inerts in any quantity, for any job . . .

KEMP INERT GAS GENERATORS

—are best 3 ways!

1. Easy to start, set and forget

With Kemp's unique carburetor and external test burner, you check the pre-mixed gas-air ratio *before* it enters the combustion chamber . . . start fast with the electric ignition. Then set the vernial dial and forget it! The carburetor maintains the exact air-gas ratio—no rechecking needed.

2. Precise fuel control

You'll find the Kemp Carburetor automatically pre-mixes and keeps gas and air at the exact mixture you wish. And no matter what the total demand or pressure changes in your supply line, this precise air-gas ratio is maintained at all times.

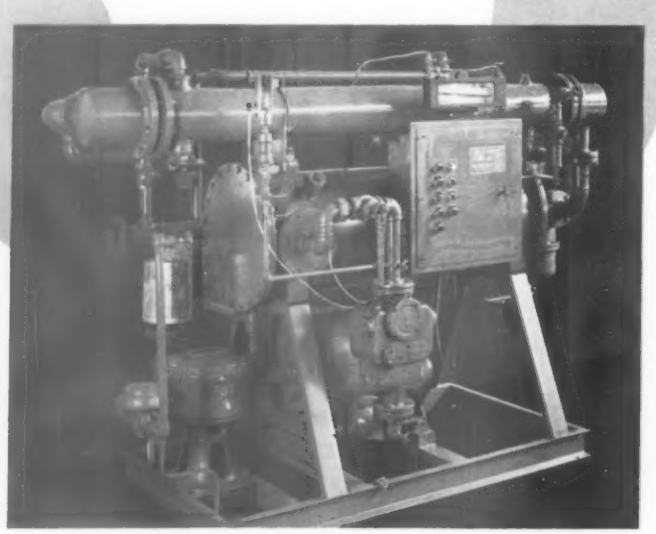
3. Automatic safety

Kemp safety controls eliminate the danger of flame-out. An electronic flame-failure control instantly, automatically cuts off the carburetor's gas supply. This control operates under all conditions . . . unaffected by moisture or combustion chamber pressure.

If you need inert gases for blanketing, purging and protective uses, write for Bulletin L-10 . . . or call in your Kemp Man listed in the yellow pages or the Chemical Engineering Catalog.

It always pays to come to

KEMP
OF BALTIMORE



THE C. M. KEMP MANUFACTURING COMPANY
405 E. Oliver Street • Baltimore 2, Maryland

Guiberson's New *Rotating* J2 DRILLING HEAD

Now you can do well servicing and completion work better than ever with Guiberson's J2 Drilling Head that has a built-in, compact rotary table. Twenty-one new features have been built into this husky head. All designed for longer life..easier maintenance..faster, more profitable jobs for you.

USE IT FOR REVERSE OR CONVENTIONAL CIRCULATION. For your drilling or servicing work set-up the J2 head either way. Then circulation can be changed back-and-forth at will for faster, more economical cleanout.

USE IT FOR GAS OR AIR DRILLING. The new type wash pipe is designed for continuous drilling. An advantage you can use to complete jobs faster..more economically.

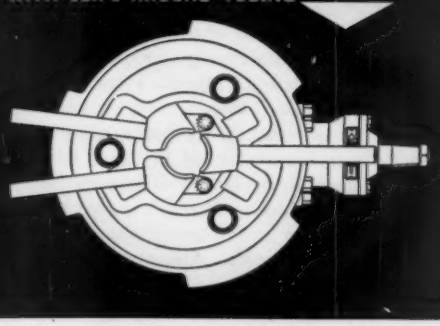
USE IT FOR SLIM-HOLE DRILLING. You'll like the unitized slips for one-man operation..more pipe holding strength..easier on your tubing. Plus the heat-treated kelly drive bushings for longer wear.

ADDITIONAL FEATURES. Heavy-duty spindle..retainer ring takes spindle load..wash pipe hardened *throughout*, not just case hardened..wash pipe packing replaceable in field..two lubricated dust seals protect bearings and gear..strong lifting eye hooks, cast integral with body..fast, easy rubber tightening with 3 studs..quick detaching top for easy rubber removal.

Sold by Oil Field Supply Stores Everywhere

TYPE J2 DRILLING HEAD WITH KELLY BUSHINGS IN PLACE

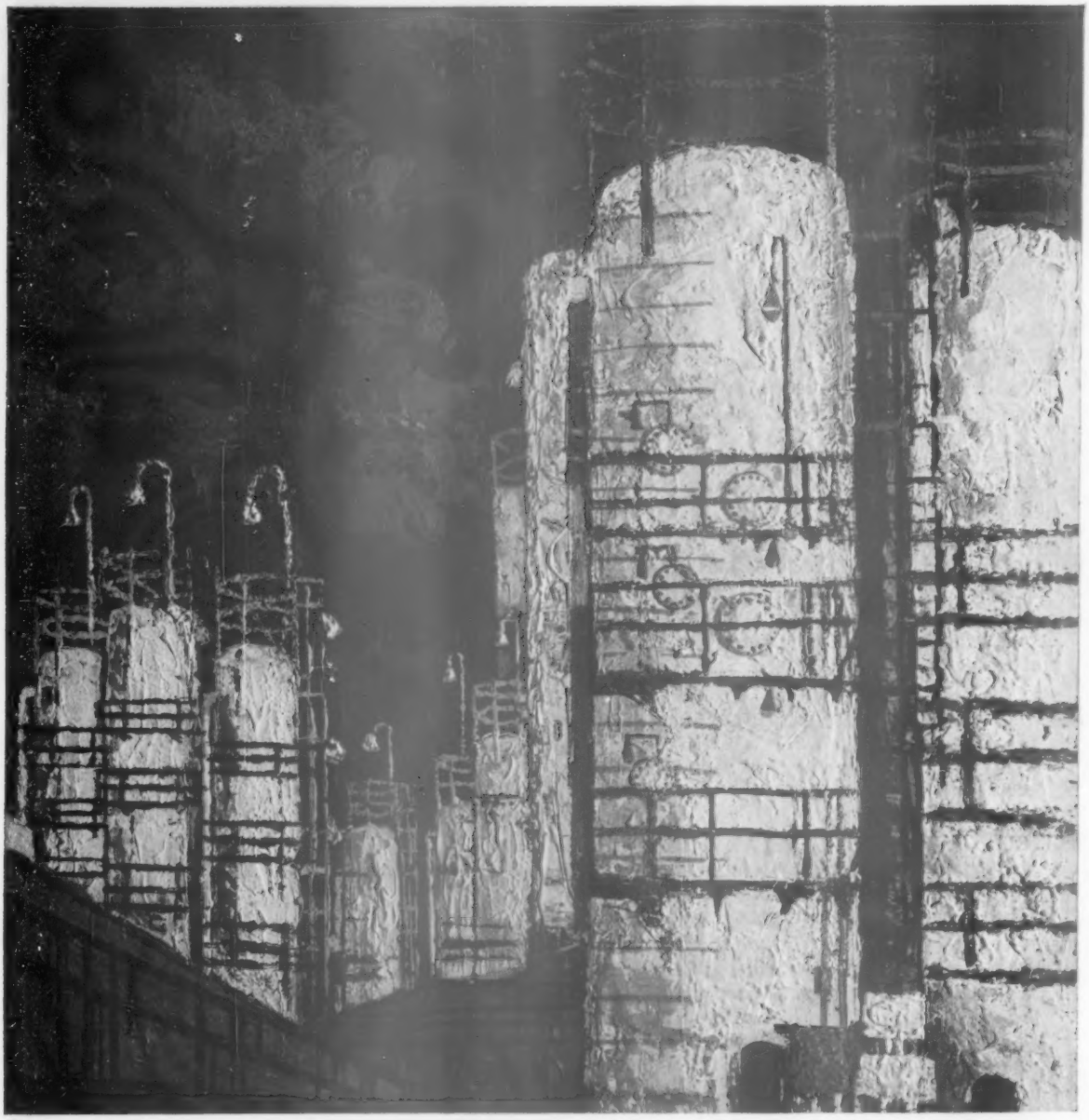
HEAD WITH SLIPS AROUND TUBING



THE GUIBERSON CORPORATION

ESTABLISHED 1919

DALLAS, TEXAS U. S. A.



More drying per dollar in nine towers showed Columbia Gulf Transmission why it pays to

mix imagination with Alcoa Aluminas

Nearly ½-million lbs of Alcoa® Activated Alumina is giving Columbia Gulf Transmission Co. maximum drying capacity per dollar in one of the world's largest natural gas drying operations. Used in nine towers at the company's Rayne, Louisiana, compressor station, the activated alumina dries 690 MMSCF of natural gas per day. Average water content of gas entering the towers is 5-6 lbs water/MMSCF. Water content of the effluent gas is below ½ lb water/MMSCF. Each tower is on stream for 24 hours with a reactivation time of 6 hours. Columbia Gulf Transmission has found that no other desiccant can furnish such efficient drying at such low cost.

When effective, economical drying is your aim, it pays to mix imagination with Alcoa Activated Aluminas—the oldest commercial desiccant available and still the most efficient. For detailed data, send for a free copy of the Alcoa White Data Sheets and a comprehensive Gas and Liquid Dehydration Questionnaire. Aluminum Company of America, Chemicals Division, 709-F Alcoa Building, Pittsburgh 19, Pa.

ALCOA CHEMICALS
ALUMINUM COMPANY OF AMERICA

For finer products . . . let Alcoa add new dimension to your creative thinking!

Set the Pace!

If you don't own one—better take a *good* look at The Cardwell Nomad! ***This is your competition!*** THIS is the unit that contractors will use to set the competitive pace in the 3,000-6,000 foot servicing and workover range . . . the unit designed to make a profit *even in the toughest situations!* Of course, if you ARE the contractor who sets the pace—one look will tell you: *The Cardwell Nomad is one of the most ruggedly efficient self-propelled servicing and workover units you can buy today!*

THE CARDWELL 'NOMAD'

NO OTHER UNIT OFFERS ALL THESE:

- CARDWELL'S BIG TIME-PROVED HOIST!
- HIGH-PERFORMANCE INDUSTRIAL ENGINE!
- FULLY-ENCLOSED POWER TAKE-OFF CHAIN DRIVE!
- EASILY-ACCESSIBLE, FULLY-EQUALIZED BRAKES!
- CARDWELL'S SUPERIOR "FLEX-DISC" AIR CLUTCHES ON BOTH DRUMS!
- OPTIONAL HOIST CONTROL POSITIONS!

SEND FOR THIS — TODAY!
Just out: A new 8-page brochure with complete specifications, approved engines, applicable Cardwell masts. Write for your copy and get the *competitive* facts!

"For Tomorrow's Equipment—see Cardwell Today"

cardwell MANUFACTURING COMPANY, INC.

Box 2001, Wichita, Kansas • Cable: ALLSTEEL • Phone AMherst 7-3311

OHIO RUBBER

"CUSTOMEERED* COMPONENTS BASIC TO INDUSTRY"

ORCO IDEA PARTS

shape up OEM designs—profitably!

OHIO RUBBER IS THE GOOD SOURCE FOR THE OEM!

ACROSS THE BOARD in industry, ORCO IDEA PARTS offer the design engineer product quality evolved from Ohio Rubber's years of experience in supplying "Customeered"* components for outstanding original equipment manufacturers nationwide.

ORCO CUSTOMEERING* is geared to cut production costs—to deliver a better part. And it goes to work for you as soon as performance requirements are checked, a materials recipe is formulated, expense-shaving design modifications, if necessary, suggested. The full scope of ORCO integrated design, research and practical ingenuity in custom-manufacture of rubber, synthetic rubber, silicone rubber, polyurethane, and flexible vinyl components is focused on your component.

ORCO CAPACITY offers the facilities of four modern plants. These include design, building, and maintenance of precision molds and dies . . . permanent bonding-to-metal . . . compression and transfer molding . . . extruding of all shapes, sizes, and types . . . complete laboratory facilities . . . statistical quality control . . . coordinated production control.

SUGGESTION — send for ORCO Bulletin 715 for the complete money-saving story of "Customeering". It's yours for the asking!

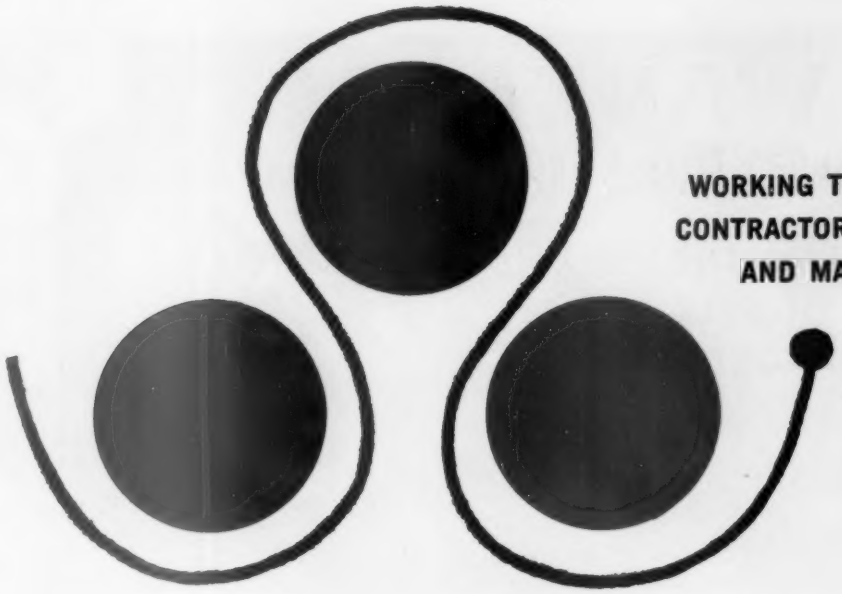
*Trademark of The Ohio Rubber Company

DE-160

ORCO **THE OHIO RUBBER COMPANY**

General Office • WILLOUGHBY, OHIO • Whitehall 2-0500

A DIVISION OF THE EAGLE PICHER COMPANY



WORKING TOGETHER...
CONTRACTOR, PRODUCER,
AND MAGCOBAR

plan mud programs for pay and profit

High drilling costs can be cut by efficient use of drilling fluids. The right drilling chemicals, **used right** by Magcobar engineers, can help increase penetration rates, save on trips and bits, reduce materials needed, and save on equipment and manpower.

But, to make sure that the mud program is the most efficient, it must be planned from the beginning. And, because it must deal with many specifics, it can be developed only with the close cooperation of producer, contractor, and Magcobar engineer. A sound mud program must be based on product performance, formations to be drilled and, very important, type of equipment to be used.

By working together, a planned mud program can be developed to make full use of the money-saving advantages of Magcobar Technology. This Technology formulates special drilling fluids to reduce or prevent damage to the pay, resulting in quicker completion, higher production, and less need for expensive stimulation work. Magcobar Technology can help you as a contractor to drill wells more cheaply, can help you as a producer to have better wells. Drill your next wells with Planned Mud Programs with Magcobar.

Magcobar
Complete
DRILLING MUD SERVICE

NOT ONLY **WAUKESHA**
the World's Finest Oil Field Power

- GAS GASOLINE
- NORMAL DIESELS
- TURBOCHARGED DIESELS

4-cyl. • 6-cyl. • 12-cyl.

Most powerful Waukesha—1235 hp

AND

WAUKESHA
ENGOMATIC
POWER CONTROL SYSTEM
. . . for automatic engine operation

by Remote Control . . . Time Cycle . . . Liquid Level or Temperature Differential . . . Radio Impulse . . . or by any Signal peculiar to the equipment involved!

NOW a complete line of CONTROLS

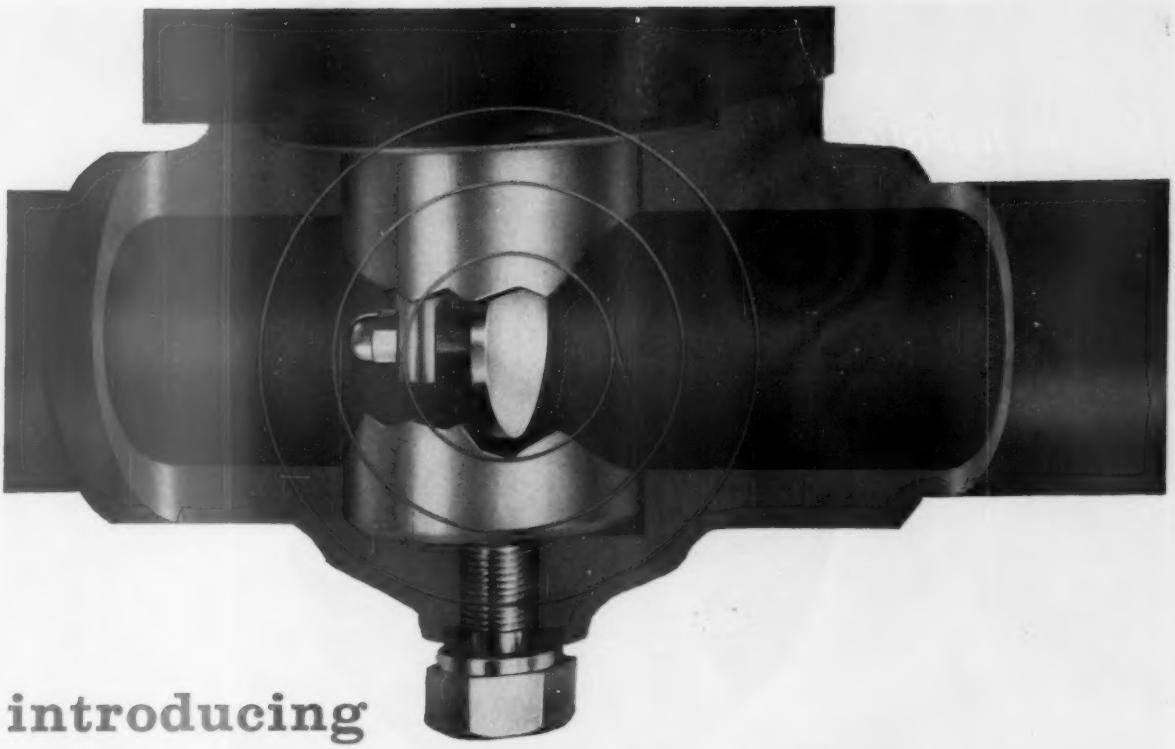
for WAUKESHA ENGINATORS®

- TOP-GENERATOR MOUNTED PANELS
- SIDE-GENERATOR MOUNTED PANELS
- EXTENDED BASE PANELS
- WALL MOUNTED PANELS
- FLOOR PANELS
- AUTOMATIC START-STOP PANELS
- AUTOMATIC BATTERY CHARGING PANELS
- AUTOMATIC LOAD TRANSFER SWITCH PANELS

®Registered—ENGINATORS are built ONLY by Waukesha Motor Company, at Waukesha, Wisconsin, and Clinton, Iowa.

402

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS. / New York • Tulsa • Los Angeles
Factories: Waukesha, Wisconsin and Clinton, Iowa



introducing
the Foxboro Target Flow Meter

new, improved way to measure the "tough ones" ... heavy oils and viscous liquids to 750° F— installs directly in line... no pressure taps to foul or plug up—high repeatability—low maintenance—write for TI 37-84a, or contact your Foxboro Field Engineer.

FOXBORO
REG. U. S. PAT. OFF.

THE FOXBORO COMPANY
606 Neponset Ave., Foxboro, Mass.

The Foxboro Target Meter is installed directly in the flow line. A stainless steel "target," extending into flow stream, senses mechanical force of fluid pushing against it. Force is then converted to a pneumatic signal and transmitted to a remote recorder or controller.

Pipe lined with TEFLON® cuts maintenance and replacement costs

When a piping installation must operate under two or more of these conditions: acidic, solvent, high temperature, oxidation—pipe lined with a TEFLON TFE fluorocarbon resin is uniquely applicable. Unlike other materials commonly used in piping installations, TFE resins are not affected by acids, alkalis and solvents at high temperatures, and they withstand even the aqueous fluorides.

In many cases, pipe lined with TEFLON TFE resins has continued to give satisfactory service after years of use where other pipe required regular replacement after a month or two. Maintenance costs and costly process shutdowns have been sharply reduced. For example, sections of pipe lined with a TEFLON TFE resin in an operation for H_2SO_4 recovery from coal-tar sludge at 250°F., at 50 psi, have required no maintenance in over 4 years of service.

Pipe lined with TEFLON TFE resins offers many other advantages. TEFLON TFE resins are rated for use up to 500°F. Pipe liners made from TFE resins won't shatter under vibration or physical or thermal shock. The non-adhesive properties of TEFLON TFE resins make them ideal for handling sticky or viscous substances. The liner flared over the flanges provides complete protection for the metal from the process fluids and eliminates the need for additional gasketing. Installation costs are further reduced because the pipe is equipped with standard flanged fittings which are easily connected. And the need for careful aligning, hanging, welding and other special procedures is eliminated.

For long service life, greatly reduced maintenance and downtime, and greatly increased plant safety, install pipe lined with TEFLON. For more details on properties and performance send for the new bulletin on "Lined Pipe"... and for more general information, ask for the fact-filled booklet "Designing with TEFLON". Write to: E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Department T-30-6, Room 2526, Nemours Building, Wilmington 98, Delaware.

In Canada: Du Pont of Canada Limited, P.O. Box 660, Montreal, Quebec.

DU PONT REG. U. S. PAT. OFF.

TEFLON® FLUOROCARBON RESINS

TEFLON is Du Pont's registered trademark for its family of fluorocarbon resins, including TFE (tetrafluoroethylene) resins and FEP (fluorinated ethylene propylene) resin.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

Now- 12 All-steel Sizes

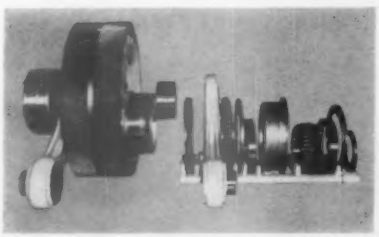
IDECO MUD PUMPS

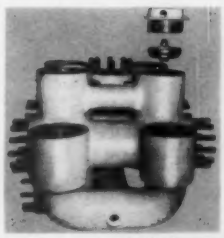
Power pumps that deliver a high pressure punch — Ideco builds them in twelve sizes, duplex and triplex, from 200 to 1250 H.P.

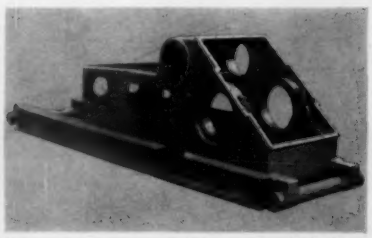
These all-steel pumps feature precision-built power ends and streamlined one-piece fluid ends which work together as a tough team to help you show more profit in today's competitive market.

Ideco pumps are a product of the application of years of engineering experience by men who really know pumps. Fabricated all-steel design assures minimum vibration . . . heat treated pinion shaft and Falk herringbone main gear can be reversed for double life . . . double-row Timken tapered roller bearings assure durability. Threaded valve pot covers speed valve servicing and reduce crew work. Gamma ray and strain gauge tests prove the strength of every part.

So remember, when you think of mud pumps . . . think of Ideco — you'll get the best. Just ask the men who have been using them.







Top quality components such as Timken bearings and Falk herringbone gears assure longer, trouble-free performance. Streamlined, one-piece cast steel fluid ends are designed for highest volumetric efficiency and tested to twice rated operating pressures. Fabriform frames are stronger and lighter in weight.

Increased Profits for You . . . Engineered by Ideco

IDECO

P. O. BOX 1521
DALLAS, TEXAS

DRESSER
INDUSTRIES, INC.

Kellogg Design Sets the Pace in

Coker Economy and Efficiency

GREATER FLEXIBILITY OF UNIT DESIGNS PLUS COKING-FREE FURNACE DESIGNS OPTIMIZE END VALUE OF HEAVIEST STOCKS

A Kellogg-designed delayed coker together with a Kellogg-designed furnace offer refiners a most effective and economical way to upgrade bottoms and other heavy stocks.

Kellogg cokers can be designed to operate on virgin crude, atmospheric or vacuum residues, thermal tars, or catalytic cracker cycle stock. As a combination coker-visbreaker, a Kellogg unit can produce either fuel oil or catalytic cracker feed, or both. As a combined coker-flasher tower, it can eliminate the need for a vacuum tower.

Kellogg furnaces reduce downtime for cleaning to a minimum. Continual improvements in designs have long since made frequent turnarounds an expense of the past. With the better heat distribution and dispersement built into Kellogg furnaces, tubes remain virtually coke-free. On-stream efficiency of Kellogg units is close to 95%.

A Record of Coking Accomplishment

Since 1936, Kellogg has engineered, erected, or contracted for 19 delayed or fluid coking units, as shown at right. These represent a total design capacity of 202,365 BPSD and a total coke production capacity of more than 5,893 tons.

Kellogg welcomes the opportunity to discuss with you how this broad experience can be used to advantage in meeting your specific coking requirements.

THE M. W. KELLOGG COMPANY

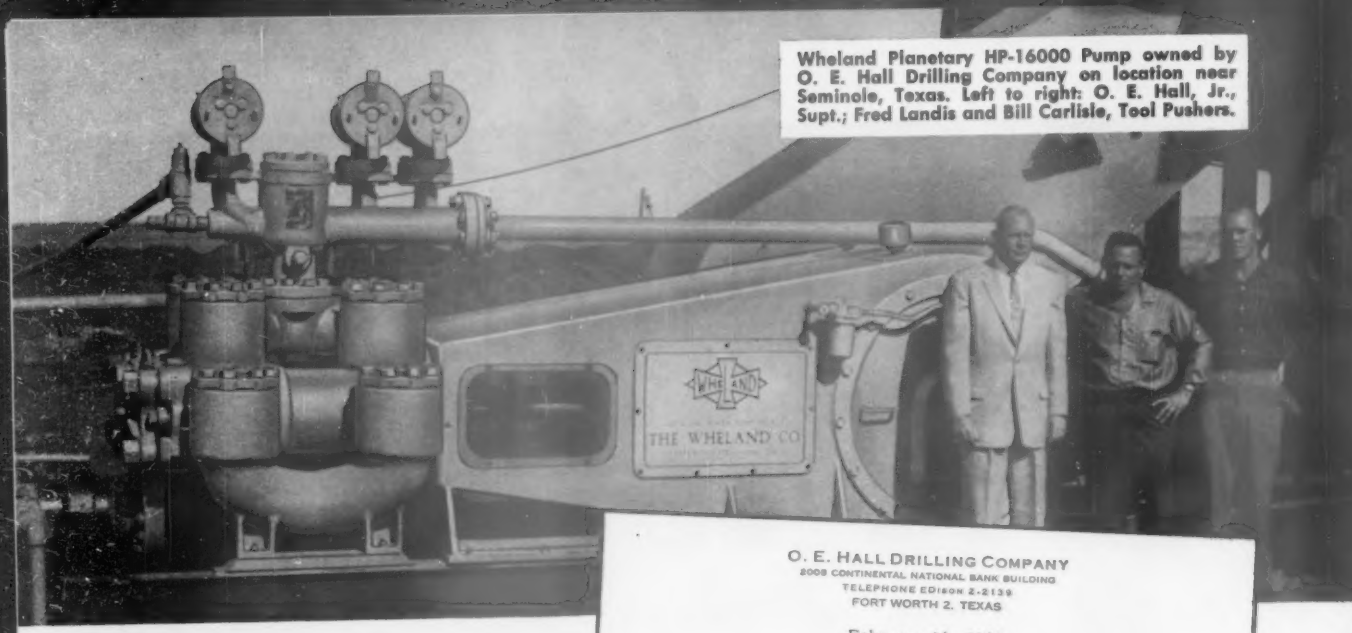
711 Third Avenue, New York

A subsidiary of Pullman Incorporated

Offices of other Kellogg companies are in Toronto, London, Paris, Rio de Janeiro, Caracas, Buenos Aires

Whiting, Ind.	6,650 BPSD
Ponca City, Okla.	4,785 BPSD
Fort Worth, Texas	6,050 BPSD
Sarnia ,Ontario	7,800 BPSD
Oleum, Cal.	20,000 BPSD
Toledo, Ohio	8,500 BPSD
Trenton, Mich.	4,000 BPSD
Torrence, Cal.	26,000 BPSD
East Chicago, Ind.	17,500 BPSD
Buenos Aires, Argentina	18,000 BPSD
Lima, Ohio	19,500 BPSD
Edmonton, Alberta	2,132 BPSD
Amarillo, Texas	3,572 BPSD
Ponca City, Okla.	12,500 BPSD
Tulsa, Okla.	7,000 BPSD
Toledo, Ohio	7,530 BPSD
Lujan de Cuyo, Arg.	18,486 BPSD**
Eldorado, Kansas	8,560 BPSD
Montreal, Quebec	3,800 BPSD*

*Fluid Coker **Future



Wheland Planetary HP-16000 Pump owned by O. E. Hall Drilling Company on location near Seminole, Texas. Left to right: O. E. Hall, Jr., Supt.; Fred Landis and Bill Carlisle, Tool Pushers.

"... the pump has improved our operation ...we will be happy to recommend it."

O. E. HALL, Jr.

WHELAND PLANETARY HP-16000 PUMP

Duplex Power Slush Pump

7¾"x16", 600 HP at 65 RPM

O. E. HALL DRILLING COMPANY
2009 CONTINENTAL NATIONAL BANK BUILDING
TELEPHONE EDISON 2-2139
FORT WORTH 2, TEXAS

February 16, 1960

The Wheland Company
Signal Mountain Road
Chattanooga, Tennessee

Mr. Gordon L. Smith, Jr.
Manager Rotary Drilling Equipment Sales

Dear Mr. Smith:

We thought you would be interested to know how pleased we are with the performance of our Wheland Planetary HP-16000 Pump. It is the smoothest running pump we have seen. The big gear reduction makes possible such a small sheave and the pump pulls very easily. We are also impressed by the compactness of the gear cartridge and the smooth performance of the new circular crosshead. In the several wells we have drilled thus far the pump has improved our operation in terms of penetration rate and savings in bits. Also has exceeded our expectations.

All of these wells have been located in West Texas. We operate our rigs throughout the Permian Basin covering a depth range of 4,500 feet to 12,500 feet with modern equipment.

We want to commend The Wheland Company for stepping forward with this improved design in slush pumps, and we will be happy to recommend it.

Very truly yours,

O. E. HALL DRILLING COMPANY

O. E. Hall, Jr.

O. E. Hall, Jr.
Midland, Texas

WHELAND

ROTARY DRILLING MACHINERY

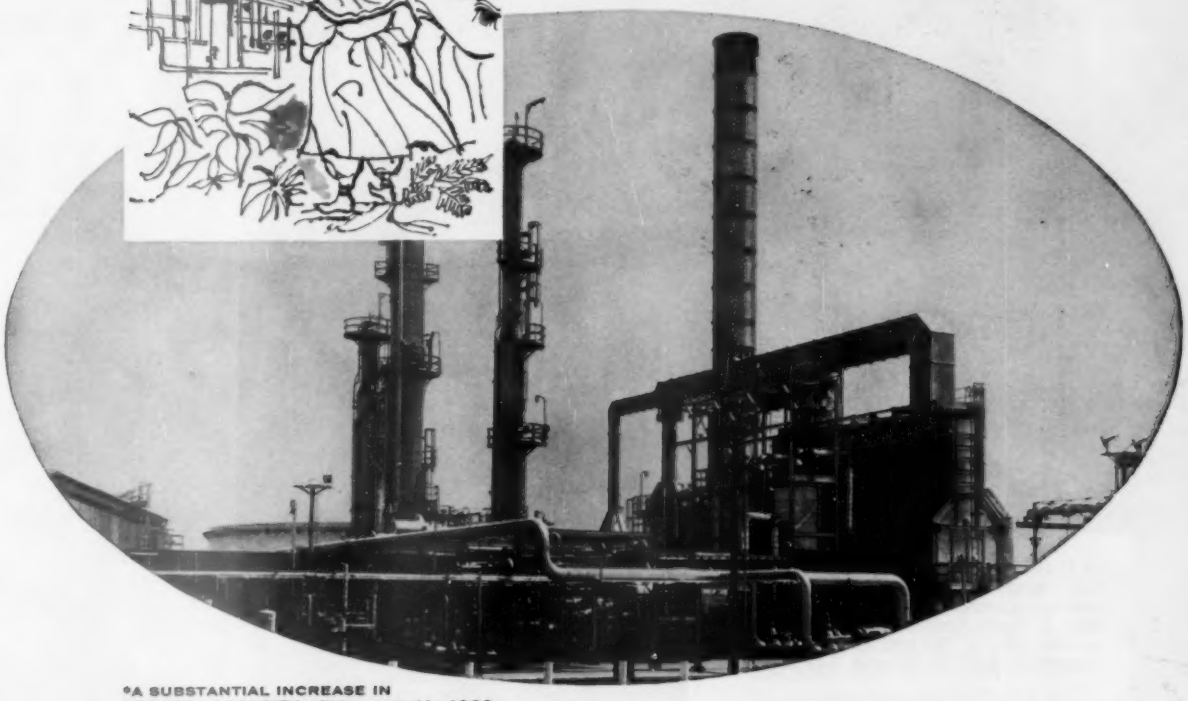
THE WHELAND COMPANY
CHATTANOOGA, TENNESSEE, U.S.A.

DRAW WORKS • SLUSH PUMPS • ROTARIES
CROWN BLOCKS • TRAVELING BLOCKS • SWIVELS

DOMESTIC DISTRIBUTORS: INDUSTRIAL SUPPLY COMPANY, INC.—Main Office: Wichita Falls, Texas • HOUSTON OIL FIELD MATERIAL COMPANY, INC.—Main Office: Houston, Texas.

EXPORT DISTRIBUTORS: LUCEY EXPORT CORPORATION—233 Broadway, New York 7, New York—Broad Street House, London, E. C. 2, England.

*'62 could be the year for you



*A SUBSTANTIAL INCREASE IN PROCESS CAPACITY will be needed by 1962, according to reliable estimates . . . NOW is the time to start your planning!

PROCON *Incorporated*

1111 MT. PROSPECT ROAD,
DES PLAINES, ILLINOIS, U.S.A.

PROCON INTERNATIONAL S.A.
PROCON (CANADA) LIMITED, TORONTO 18, ONTARIO, CANADA
PROCON (GREAT BRITAIN) LIMITED, LONDON, W. C. 2, ENGLAND
PROCON PTY. LIMITED, SYDNEY, AUSTRALIA
PROCOFRANCE S.A.R.L., PARIS, FRANCE
PROCON LIMITADA, SAO PAULO, BRAZIL
VICAPROCON, S. A., CARACAS, VENEZUELA

PROCON

WORLD-WIDE CONSTRUCTION
FOR THE PETROLEUM, PETROCHEMICAL,
AND CHEMICAL INDUSTRIES

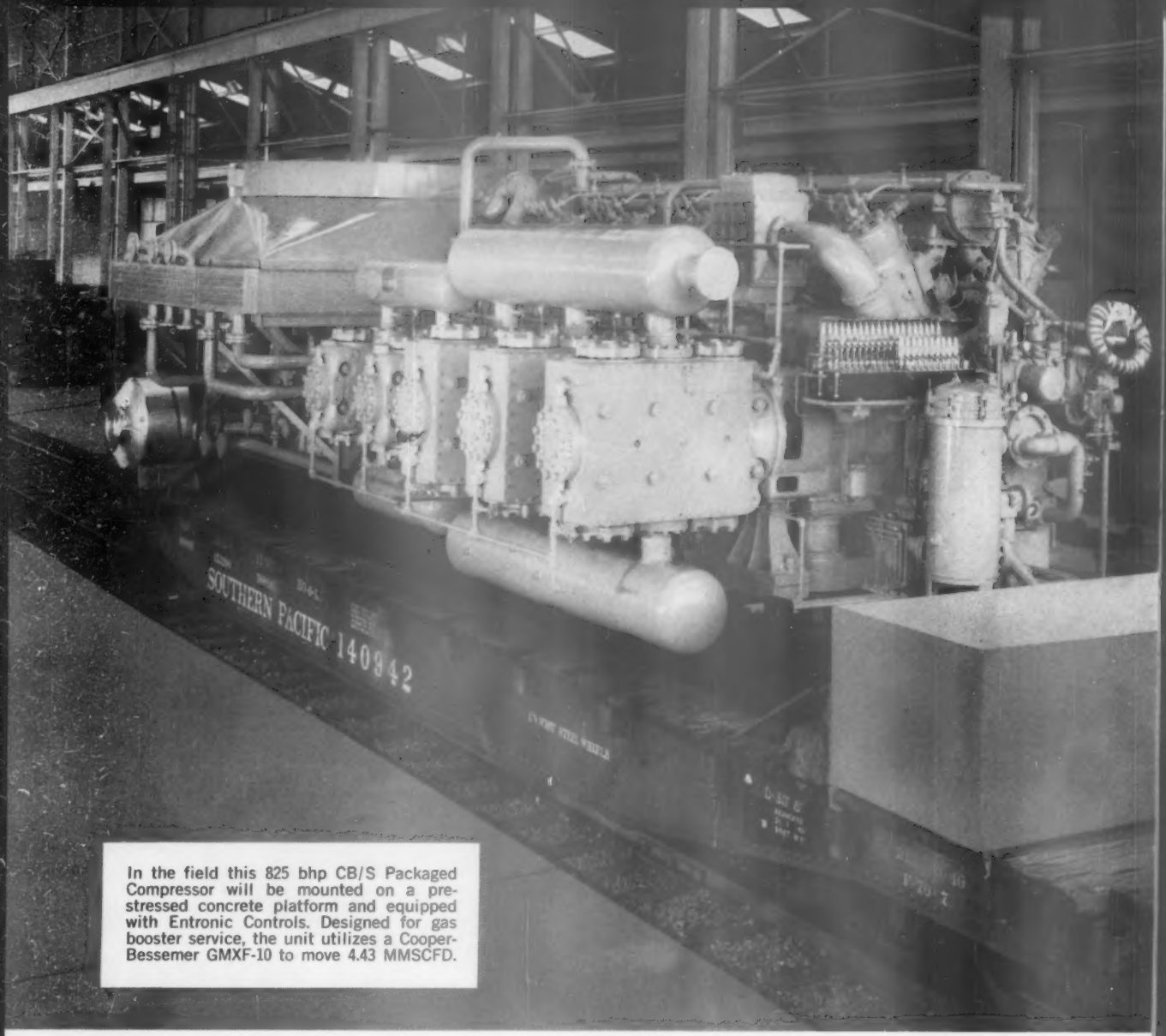
STAMP OF CHARACTER—YOURS!

As personal as your signature! As individual as you! That's the kind of plant you get when you entrust the construction to Procon.

Process designs, flow charts, piping designs, plot plans, all take shape under the hands of skilled designers and construction-wise engineers. These men make the job as distinctively yours as your portrait!

At home or abroad, for petroleum, petrochemical or chemical processing, creative construction by Procon is your assurance of a plant built as you want it, to operate exactly as specified.

Before you plan for your next expansion or plant improvement program, consult Procon.



In the field this 825 bhp CB/S Packaged Compressor will be mounted on a pre-stressed concrete platform and equipped with Entronic Controls. Designed for gas booster service, the unit utilizes a Cooper-Bessemer GMXF-10 to move 4.43 MMSCFD.

Building packaged compressors is our business . . . our only business. This single objective is the reason CB/S Packaged Compressors are more advanced in design . . . more efficient in the field.

CB/S
PACKAGED
COMPRESSORS

CB/S

C-B SOUTHERN, INC., P. O. BOX 19267, HOUSTON 24, TEXAS

A subsidiary of The Cooper-Bessemer Corporation.

A Nalco PRODUCT MANAGER

Answers Basic Questions on Coagulation of Solids in Potable, Process and Waste Waters

New Chemicals and New Techniques Mark Advances in Solving A Frequent Plant Operating Problem

Improved methods of chemical clarification are constantly being developed, tested, and put into full-scale commercial use. Here are answers to some of the questions we hear frequently in this area of Nalco service activity.

Question: What is coagulation?

Answer: Coagulation is the agglomeration—chemical gathering together—of the very fine solid particles suspended in water. These particles create turbidity, coloring, and some types of odors.

Question: What are the advantages of coagulation over sedimentation?

Answer: Speed, more effective clarification, and smaller capital equipment investment are all advantages of coagulation over sedimentation.

Question: Are all coagulation requirements the same?

Answer: No. In some cases, a high degree of sparkling clarification is essential. In others, a lesser degree of clarification is satisfactory. Sometimes, the removal of color is the only job to be done. Seasonal and other changes in water and turbidity characteristics also change the type and amount of treating necessary. Overall quality of the water must be compatible with the end-use requirements--not based on a fixed "cure-all" treatment program.

Question: What are the characteristics of a good coagulation program?

Answer: Continuous production of water of the necessary clarity and quality to meet end-use requirements; with the flexibility to handle changing conditions in input water characteristics. A good coagulation program should also increase the length of filter runs.

Question: Historically, what coagulant chemicals have been used?

Answer: Most common chemicals used as coagulants were: iron salts, alum (aluminum sulfate), and lime (calcium hydroxide).

Question: What are some of the more recent improvements in the field of coagulation?

Answer: Sodium aluminate is probably the first of the "modern" coagulants. It supplies an alkaline source of alumina with a negative (anionic) charge, and constitutes a coagulant which ideally meets the requirements of principal coagulation process uses—frequently with alum, to improve flocculating and give faster settling rates at lower overall costs.

Natural and synthetic organic polymers are the most recently-developed coagulant chemicals. They are high molecular weight materials which are anionic, cationic, or nonionic; and function as high-efficiency coagulant aids. Or, as is true with the cationic polyelectrolyte developed by Nalco, they may function as both coagulants and coagulant aids. Use of these materials provides greatly increased floc particle size and weight, resulting in increased clarity, longer filter runs, and increased throughput rates.

Question: Will any of these newer coagulant chemicals solve all clarification problems?

Answer: No. There is no all-purpose coagulant chemical; nor is there likely to be one. Too many variables enter into the choice of proper chemicals to fit specific operating conditions: from the type of influent water through kinds and arrangements of equipment to the clarity needs of effluent water.

J. T. Burke, Manager
Nalco Coagulation Chemicals Department

Question: What is the best approach to solving a specific coagulation problem?

Answer: Take all the factors involved, and accumulate specific information on them: (a) Make a thorough investigation of the supply water, the equipment employed, the end use of the water, and the performance characteristics of chemicals available for coagulation and coagulation aid. (b) Test coagulation with various chemicals by beaker tests and other laboratory evaluation techniques. Evaluation should include analysis of waters produced, to make certain that the quality is compatible with end-use requirements. (c) Get the advice and assistance of experts as to methods and locations of applying chemical treatments to get maximum coagulation efficiency.

Question: Does Nalco provide the experts to gather this information?

Answer: Yes—in addition Nalco supplies the most complete line of coagulants and coagulant aids in the industry.

Question: How is Nalco qualified to help solve coagulation problems?

Answer: Nalco's basic background is successful water treatment. The Coagulation Chemicals Department at Nalco is made up of "specialists' specialists": men whose sole job is to provide Nalco Representatives and their customers with the materials and assistance necessary to solve coagulation problems.

No other organization has more experience or better facilities to solve *your* coagulation problem, promptly and economically. Call or write for action now.

NALCO CHEMICAL COMPANY
6216 West 66th Place • Chicago 38, Illinois
Subsidiaries in England, Italy, Mexico, Spain, Venezuela and West Germany
In Canada—Alchem Limited, Burlington, Ontario

nalco® ... Serving Industry through Practical Applied Science

Nalco CHEMICALS
Nalco SERVICES
Nalco CHEMICALS
Nalco SERVICES
Nalco CHEMICALS
Nalco SERVICES
Nalco CHEMICALS
Nalco SERVICES
Nalco CHEMICALS
Nalco SERVICES
Nalco CHEMICALS
Nalco SERVICES
Nalco CHEMICALS
Nalco SERVICES
Nalco CHEMICALS
Nalco SERVICES
Nalco CHEMICALS
Nalco SERVICES
Nalco CHEMICALS
Nalco SERVICES
Nalco CHEMICALS
Nalco SERVICES
Nalco CHEMICALS
Nalco SERVICES

Morse HY-VO® shatters roller-chain speed barrier!

HY-VO TRAVELS FASTER . . . LASTS LONGER!

Morse Hy-Vo drive travels far beyond the speed limitations of roller chain. Hy-Vo delivers up to 13,250 fpm. It runs *faster*, smoother, cooler, quieter and lasts *longer*. Application after application in oil field service, for over nine years, proves that Hy-Vo pays for itself. It permits rig manufacturers and drillers to use lower cost, high-speed, more mobile engines. And, unlike roller chain, Hy-Vo needs no special tools to assemble or disassemble it in the field.

For high speed . . . high horsepower applications, Hy-Vo drives outperform and outlast all others. Get the money-saving facts today. Write: Morse Chain Company, Dept. 22-60, Ithaca, N.Y. Export Sales: Borg-Warner International, Chicago 3, Ill. In Canada: Morse Chain of Canada, Ltd., Simcoe, Ontario.

OIL FIELD WAREHOUSES: Casper, Wyo.; Charlotte, N.C.; Chicago, Ill.; Farmington, N.M.; Hobbs, N.M.; Houston, Tex.; Los Angeles, Calif.; Odessa, Tex.

COMPARISON—based on 500 hp 1½" chain—25-tooth sprocket

ROLLER CHAIN		HY-VO
WIDTH	7½" 4 strand	5"
SPEED LIMITATION	4,400 fpm 1,400 rpm	13,250 fpm 4,250 rpm

MORSE B-W

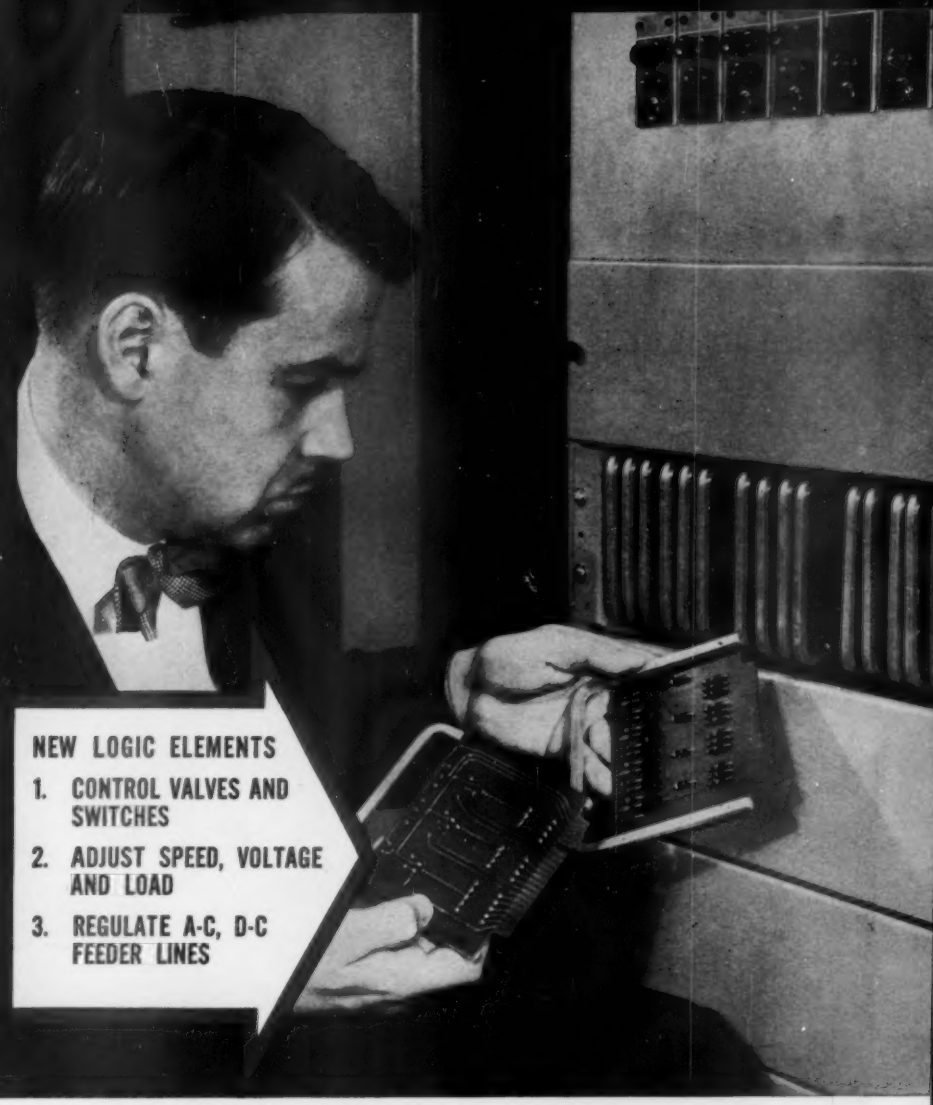
A BORG-WARNER INDUSTRY

FOR PIPELINE, PETROLEUM INDUSTRIES

FOR INDUSTRIAL POWER DISTRIBUTION

FOR ELECTRIC UTILITIES

FOR COMMERCIAL BUILDINGS



NEW GENERAL ELECTRIC **SOLID-STATE** SUPERVISORY OFFERS...

Versatile, Economical Remote Control for a Variety of Applications

New General Electric solid-state supervisory equipment, with pre-tested transistorized logic elements, is now available to control and supervise any piece of electrical apparatus having provision for local control. No matter what the application—in pipeline and petroleum industries, electric utilities, industrial power distribution applications, or in commercial building and municipal projects—this equipment now provides better operational programming and improved utilization of equipment and personnel.

You also get top economy. In addition to impressive application versatility, G-E solid-state supervisory offers important money-saving features. You save up to 50 percent on costly space. Time-saving ease of installation is afforded by 25 percent reduction in equipment weight.

Once installed, maintenance is cut drastically because the new logic elements have no moving parts, require no adjustments. Solid-state logic elements on plug-in cards are available for off-the-shelf delivery.

If you need versatile remote control for your equipment, it will pay you to get all the facts on solid-state supervisory control by General Electric. Contact your nearest Apparatus Sales Office today, or write for publication GEA-7043, General Electric Co., Schenectady 5, New York.

313-12

Progress Is Our Most Important Product

GENERAL ELECTRIC

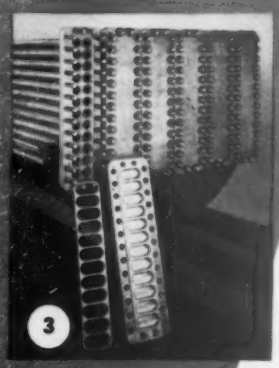
Consolidate all your plant "waste heat" sources with this unique

Vogt multi-stream STEAM GENERATOR

1 This unit has 1700 square feet of heating surface and is designed to generate 13,125 pounds of steam per hour at 150 pounds pressure. Note the six separate and independent circuits of the tube bundle stationary end which is bolted to shell.

2 Tube bundle floating end prior to bolting covers to the independent floating tube sheets.

3 Floating end of the tube bundle consists of six independent circuits each with its own tube sheet, gasket and cover with special integral baffles.



Put unused sources of heat to work by concentrating them in a Vogt Multi-Stream Steam Generator.

The purpose of the design is twofold. First, it is possible to utilize several hot streams if there is insufficient heat recovery in one stream. Second, if one hot stream is used it can be split into several circuits whereby the flow is only one-tube-per-pass. This prevents plugging of tubes when handling fouling or polymerizing liquids.

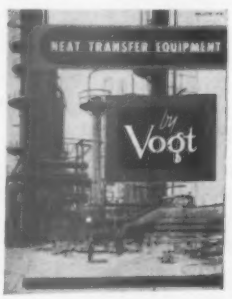
The design incorporates a number of separate circuits enclosed in a single shell. The circuits are independent of each other and each stream can be separately shut off and cleaned without affecting the operation of the others. Thus the unit can be kept continuously on the line by operating one or more streams.

HENRY VOGT MACHINE CO.

P. O. Box 1918, Louisville 1, Ky.

sales offices
NEW YORK • CAMDEN, N. J. • ST. LOUIS
LOS ANGELES • CLEVELAND • CINCINNATI
CHARLESTON, W. VA. • DALLAS • CHICAGO

Bulletin HE-8 illustrates many unusual as well as standardized types of heat exchangers. Write for your copy to Dept, 24A-XO.



SPECIAL REPORT TO MANAGEMENT

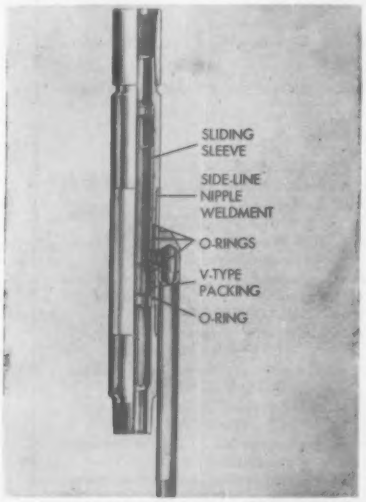
OTIS PRODUCTION NEWS

Volume II, Number 2 **Otis Engineering Corporation • Dallas** *Production Equipment and Services*

New Otis Cross-Over Tool Solves Zone Feeding Problem In Single String Dual Completions

Sliding Side-Door® With Special Weldment Provides Complete Zone Isolation With Cross-Over Chokes Out of Well

CORPUS CHRISTI — Another downhole completion and production problem has been solved by Otis Engineering Corporation with the development of a new type of cross-over tool. The new tool is essentially a Type A Otis Sliding Side-Door to which has been added a special one-inch pipe weldment on one side of the outer mandrel, in place of



the usual slotted ports. The tool is designed to be made up in the tubing with a short tubing sub and Type S Otis Landing Nipple above it and a tubing sub and Ported Landing Nipple below it, and then set in a dual or by-pass type packer. When installed with a Type SS Otis Plug Choke set in the ported nipple, the sleeve may be opened to permit production from the upper zone to be brought into the tubing through the one-inch pipe weldment while flow from the lower zone is directed into the annulus.

See schematic well diagram — right

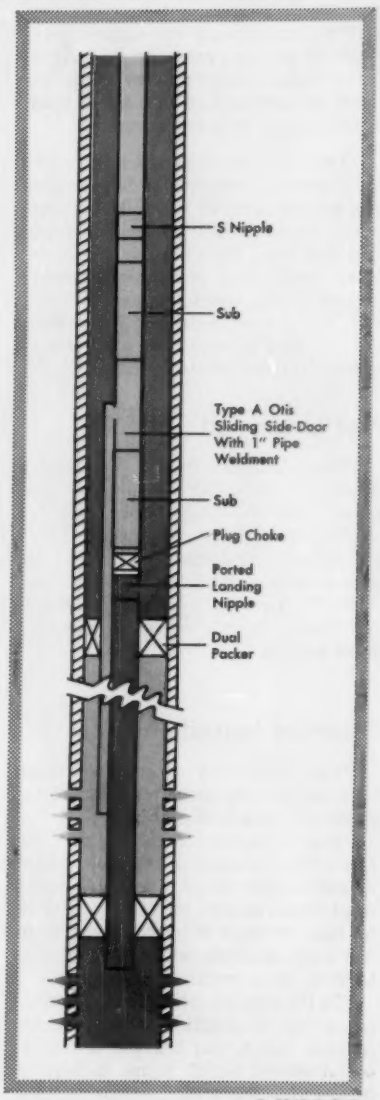
If desired, a straight flow choke may be landed in the assembly to permit production of the lower zone through the tubing while flow from the upper zone is produced through the annulus.

This new Otis Sliding Side-Door Cross-Over was developed at the request of a progressive Texas-based producing company which had experienced extended periods of lost production from the low pressure zones in its single string dual completions after changing a cross-over choke in conventional cross-over equipment, or when a choke had been out of the well for a short period of time for various types of wire line work. This loss of production proved to be the result of the high-pressure zone feeding the low-pressure zone.

According to the company, the new Otis Sliding Side-Door Cross-Over not only proved effective in solving its zone feeding problems, but it has also eliminated the need of having a pump truck on location to equalize pressure across the two zones — as was frequently necessary before the choke could be removed from conventional cross-over equipment. The company also reports it has successfully fractured the upper zone of a number of its wells through the one-inch pipe without damaging the tool.

The Type A Otis Sliding Side-Door, from which this new type of cross-over was derived, is a circulating and production tool which is used downhole to provide selective communication between the tubing and the annulus. The tool has a ported sleeve which is designed to be moved up or down within a ported mandrel. The sleeve may be shifted by one of two ways: 1) by standard wire line methods, or 2) by pumping down an expendable shifting tool. V-type packing and O-rings are used to provide a positive seal between the sleeve and the mandrel when the sleeve is closed.

The new Otis Sliding Side-Door Cross-Over is another example of the ingenuity of Otis' well completion specialists in the field and its engineering department in Dallas. Literally thousands of production problems of this nature have been solved by Otis over the past 32 years. For more information on the new Otis Sliding Side-Door Cross-Over, or for help with any specific production or completion problem, call the Otis office nearest you or write Otis, Dept. 2-W, Box 35206, Dallas 35, Texas. You will find your Otis specialist ready to help you — anxious to serve you.



© 1960 O.E.C.

OTIS

Engineering Corporation

General Offices:

6612 Denton Drive • Dallas, Texas

They Say—

Ironic, isn't it?

"It is ironic that (some) American businessmen are so ready to accept the yoke of government dependency and control. It matters not to them that they are abandoning the historic principles of private enterprise, so long as Government shelters them from the rigors of competition and keeps them in business at taxpayers' expense.

"This is a potentially tragic course for American business to follow. Unless we disavow it, we will find ourselves shackled by a planned economy that has been inflicted on us not by some starry-eyed economic dreamers but by businessmen themselves."

T. S. Petersen, president of Standard Oil Co. of California, in a speech to company stockholders.

Not an added gallon

"Overproduction and price cutting do not sell an additional gallon of gasoline. Until the obvious remedies are applied, there is scant hope of restoring to the petroleum industry the degree of prosperity it properly merits."

P. C. Spencer, chairman, Sinclair Oil Corp., in a speech to company stockholders.

Essential ingredient

"The philosophy of some of those who support the steeply graduated income tax rates is disturbing.

"It is a matter of record that the loss of tax revenue to the government would be quite small if the top-bracket rates were reduced to, say, 50%. Yet, we have retained in peace as well as in war a tax schedule which may take up to 90% of a person's income.

"In the opinion of some of its advocates, this is justified, not alone for revenue needs, but because it aids in social reform which seems to have as its doctrine the principle that all men should be financial equals.

"I am as interested as anyone else in the betterment of our people. But complete protection from the cradle to the grave would, to a large extent, eliminate the need for individual effort. It could, in my opinion, result in a drab and colorless society almost entirely devoid of creative ideas.

"We used to believe that one of the keys to our progress and success as a

the OIL AND GAS JOURNAL

TULSA OFFICE
211 South Cheyenne Avenue
Box 1260
Phone LUther 4-4411

George H. Weber ..... Editor
Henry D. Ralph .. Chief Editorial Writer
Ted A. Armstrong ..... News Editor
Gerald L. Farrar .... Engineering Editor
Frank J. Gardner .... Exploration Editor
Paul Reed ..... Pipeline Editor
W. L. Nelson ..... Technical Editor
Lynn M. Nichols .... Presentation Editor
John C. Casper ..... Economics Editor
W. B. Bleakley ..... Production Editor
Neil Williams ..... Associate Editor
Peter B. Bike ..... Geophysical Editor
H. S. Pylant, Petrochem. & Gas-Process. Editor
Gene T. Kinney .... Asst. Pipeline Editor
R. B. Tuttle ..... Equipment Editor

C. Dudley Johnston ..... Art Director
Robert B. Bizal ..... Editorial Research
John C. McCaslin ..... District Editor
W. A. Bachman ..... District Editor
Merle F. Blakely ..... District Editor
Sara Duncan ..... District Editor
Kenneth W. Brooks ..... District Editor
Norman K. Baxter ..... District Editor
Max L. Batchelder .... Asst. Pres. Editor
Helen Brown ..... Editorial Assistant
Alice Burt ..... Editorial Assistant
Aileen Cantrell ..... Editorial Assistant
Susan Boeckman .... Editorial Assistant
Margaret Higgs ..... Editorial Assistant
Jo Jeanne Speaker ..... Staff Artist

NEW YORK OFFICE
500 Fifth Avenue
Phone LOngacre 4-1910

D. H. Stormont ..... Refining Editor
Paul Swain ..... International Editor
Ray G. Gibson ..... District Editor
John P. O'Donnell ..... District Editor

DALLAS OFFICE
1238 Mercantile Building
Phone Riverside 8-5701
Robert J. Enright ..... District Editor

HOUSTON OFFICE
802 American Investors Building
Phone CApitol 4-7726

Ed McGhee ..... Drilling Editor
Howard M. Wilson ..... District Editor
H. C. Bozeman Gulf Coast Refining Editor

LOS ANGELES OFFICE
650 South Grand Avenue
Phone MAdison 2-0722
Carl J. Lawrence ... West Coast Editor

WASHINGTON OFFICE
621 Albee Building
Phone DIstrict 7-1710
Clyde La Motte ..... Washington Editor

BUSINESS STAFF

P. C. Lavinger ..... President
S. H. Rourke .... Executive Vice President
Mitchell Tucker . Vice Pres. and Adv. Mgr.
Kenneth B. Barnes .... Vice Pres., Eastern Hemisphere Operations
Hanson B. Pigman . Vice Pres., Circulation
L. John Ford ..... Mgr. Industry Census
J. Parker Holland .. Production Manager

ADVERTISING STAFF

TULSA OFFICE
211 South Cheyenne Avenue
Phone LUther 4-4411
John D. Reilly .. Mid-Continent Manager
Roy E. Finley ..... District Manager
Philip C. Lavinger, Jr. .... Representative
D. B. Miller ..... Classified Adv. Mgr.

NEW YORK OFFICE
500 Fifth Avenue
Phone LOngacre 4-1910
E. S. Klappenbach .... Eastern Manager
Harry B. Bullen ..... Representative

PHILADELPHIA OFFICE
1509 Land Title Building
Broad and Chestnut Streets
LOcust 3-0118
John W. Meany, Jr. .... District Manager

PITTSBURGH OFFICE
Law & Finance Building, 429 Fourth Ave.
Room 1505, GRant 1-5847
Ernest S. Holzworth .... District Manager

DETROIT OFFICE
204 Washington Square Building
Royal Oak, Mich., LIncoln 7-9455
John D. Yoder ..... District Manager

LOS ANGELES OFFICE
650 South Grand Avenue, MAdison 2-0722
George O. Ruppert .... District Manager

CHICAGO OFFICE
105 West Madison Street
Phone CEntral 6-2537
David T. Kenney ..... District Manager
Karel Wegkamp ..... District Manager

HOUSTON OFFICE
802 American Investors Building
CApitol 4-7726
John M. Spears .... Gulf Coast Manager

DALLAS OFFICE
1238 Mercantile Building
Riverside 8-5701
Pren G. Hollingsworth .. District Manager

ENGLAND
38, Victoria Street, London S.W. 1
Phone, ABBey 6302

GERMANY
28 Hunsrücken Strasse,
Düsseldorf (Alstadt)
Phone 1-49-04

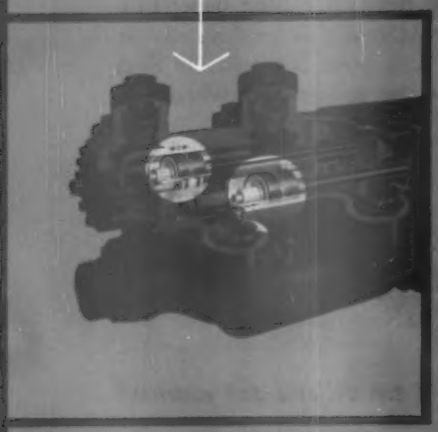
FRANCE
6, rue Franklin Roosevelt, Paris 8e
Phone, BALzac 66-70
Kenneth B. Barnes .... Vice Pres., Eastern Hemisphere Operations, Representative

Subscription rates to the petroleum industry United States and foreign, 1 year, $5.00; 2 years $8.00; 3 years, $10.00. Single copies $1.00. Back copies when over a year old, $2.00.

Member
Audit Bureau of Circulations
Associated Business Publications

the name **Mission** here

is your **guarantee of real savings here**



Take a good look at this Mission piston. Mission was first with this design, although today you'll see other pistons made to look like it. You see, the engineering advances that have gone into Mission pistons have made them the standard by which all others are judged.

Replaceable rubbers, long-life rubber compounds, special fabric backing, one-piece forged steel bodies, hardened piston flanges, close tolerances, wear groove in piston body flanges, API taper for piston bore, and easy and reliable snap rings and end plates are some of the specific reasons Mission pistons are superior.

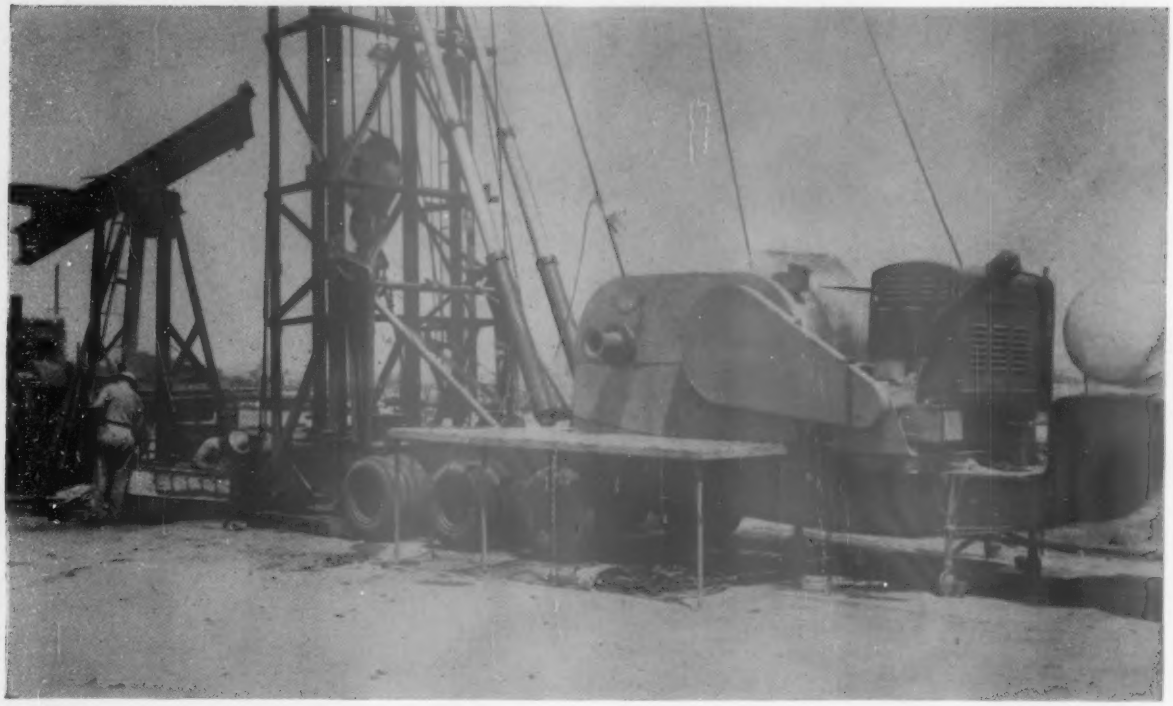
The unique Mission guarantee, that Mission products will outperform any other products, is the big reason that removes all chance. You get the best only from Mission; so get only Mission—genuine Mission with the name on them—pistons. Play it safe!

MISSION MANUFACTURING CO.

MISSION MANUFACTURING CO., P. O. Box 4200, Houston, Texas, cable address "MISSCO" • export office: 20 Rockefeller Plaza, New York In the United Kingdom: MISSION MANUFACTURING CO., LTD., 1 Hanover Square, London W. 1 England • cable address "MISSOMAN"

60—600

Better products, *faster*, from your National Seal distributor:



Toolpushers know the value of oil seals ...and National is the favorite in the field!

Both Micro-Torc* leather and Syntech* rubber —highest availability in the industry!

It's foolish to gamble with the danger of bearing failures for the want of good sealing protection against dust, grit, water and corrosion. So why not specify the finest seals you can buy for this purpose and, of equal importance, to hold lubricants where they belong?

National Oil Seals are supplied for every application . . . either Micro-Torc leather or Syntech rubber depending upon the use. That's another reason why toolpushers rely on National's high availability. Call your National Oil Seal distributor. He'll see you get the proper seals when you need them.

*Trademark

NATIONAL OIL SEALS

FEDERAL-MOGUL SERVICE

DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN

nation was the freedom each of us had to do what we legally and honorably could to obtain financial independence and a respected place in society. These were powerful incentives and they inspired many people to put forth tremendous effort to get somewhere.

"Incentive is an essential ingredient in our economy."

Fred W. Bartlett, chairman, Socony Mobil Oil Co., Inc., in a speech to company shareholders.

Jobbers' viewpoint

"First quarter reports of many oil companies are showing record high earnings. With prices generally below 'normal,' one would expect poor earnings.

"Most jobbers and dealers have been telling their customers that even at a 'normal' price the gasoline of today is a real bargain and that the depressed prices so common this year are destructive forces working a hardship on our great industry.

"Now comes the report of record earnings. Can you blame our customers for being confused? Their deduction is that price wars are not only good for the consumer, but also good for the oil industry. Perhaps present conditions are good for all in the oil business except the jobber.

"Is it a fact that the major integrated companies do not care whether their marketing segment operates at a loss so long as over-all profits are good. Do the major companies use money made outside marketing to compete with jobbers who have no other means? Is this what the marketing jobber has to look forward to as future policy? If so, how can he enthusiastically support intra-industry cooperation?

"Missouri jobbers have cooperated in the past and are willing to continue to do so. What can we expect from the major companies?"

Paul Finck, president, Missouri Petroleum Association, Inc., in a letter in the May issue of Missouri Oil Jobber, association magazine.

Amazing answers

"It is an amazing fact—but a very true one—that in the area of economics knowledge our educational system is falling far short of a goal that we must constantly keep before us. This goal is a better and more sympathetic understanding of how our economic system works.

"I have just received a copy of the opinion research report titled 'Why Too Many College Students Are Economic Illiterates.' This report force-

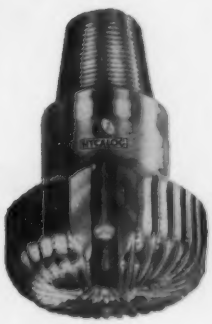
and now patented

Developed by Hycalog . . .

HYCALOG

V-DOOR DRILL BITS ~~PATENT PENDING~~ U. S. Patent No. 2,931,630

CORE AND BUST TO ACHIEVE LONG UNINTERRUPTED RUNS



Diamond drill bits were formerly handicapped in duration of runs . . . *and rate of penetration* . . . by their inability to dispose of cores formed at their centers.

In shales and other soft formations, the core twisted off and rotated with the bit.

In hard sands the core crushed the center diamonds, preventing further drilling.

BUT HYCALOG'S ENGINEERS have turned these handicaps into an advantage. Now, the V-DOOR bit, developed by HYCALOG, utilizes *controlled failing* of cores to achieve a faster rate of penetration . . . *and longer life*. HERE'S HOW:

The diamond surfaced center hole purposely cuts a cylindrical core. Valve action of core against bit reduces escape of fluid through the V-DOOR . . . forces it over the cutting surfaces keeping them thoroughly flushed.

Combination of bit design and hydraulic pressure breaks core into short segments. Then valve action is momentarily interrupted; high pressure fluid is released with a surge into V-DOOR port, forcing core fragments into discharge port.

Core fragments are flushed out of hole. With every revolution, the V-DOOR port sweeps bottom of the hole removing loose small particles, and eliminating necessity of regrinding.

Ask your HYCALOG rep to show you some performance records on the V-DOOR. He has a stack of them. *And also get the facts on* HYCALOG *well logging.*

Hycalog, Inc.

505 AERO DRIVE

SHREVEPORT, LOUISIANA

BRANCH OFFICES IN PRINCIPAL OIL PRODUCING AREAS

DIAMOND CORING • DIAMOND BITS • WELL LOGGING • CORE ANALYSIS

LARKIN
...Through Your Supply Store

fully points out that we are not giving enough attention in our education system to a better understanding of the mechanics of business. Here are some startling facts the report discloses:

"Out of 4,500 college seniors quizzed only 57% believe that our system to function must have the profit incentive. Said in another way, 43% think our system can survive without profits.

"Only 54% said that competition is a better price regulator than government control. Only 48% understand that corporate officers report to a board of directors.

"These figures were compiled from interviews with seniors without economic training. Students majoring in economics showed much more knowledge: 89% know that there must be profits; against the 54% figure for non-economics students on the question of competition-government controls, 78% of the economics majors felt competition the best. On the question of officers reporting to a board, non-economics figure of 48% was against 63% for seniors with some economics, and 71% for economics majors.

"I'm afraid we are not giving our youngsters sufficient training in the way our business system operates to enable them to properly defend and promote the free enterprise way of life."

E. B. Germany, chairman, Lone Star Steel Co., in an article in Starlight, company magazine.

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDAR

JUNE

13-15 American Association of Cost Engineers, annual meeting, Rice Hotel, Houston.

13-15 Chemical Institute of Canada, annual conference and exhibition, Chateau Laurier, Ottawa.

13-15 Interstate Oil Compact Commission, midyear meeting, Statler Hilton Hotel, Detroit.

15-16 Western Petroleum Refiners Association, Mid-Continent regional technical-industrial relations meeting, Hotel Lassen, Wichita.

16-18 International Oil Scouts Association, annual meeting, Biltmore Hotel, Los Angeles.

19-22 American Institute of Chemical Engineers, Instituto Mexicano de Ingenieros Quimicos, joint meeting, Hotel Del Prado, Mexico City.

22-25 Canadian Gas Association, annual meeting, Manoir Richelieu, Murray Bay, Quebec.

22-25 American Association of Petroleum Landmen, national convention, Ambassador Hotel, Los Angeles.

PRODUCING SLIM-HOLE?
RUN A
HARBISON-FISCHER

LITTLE SQUIRT

SLIM HOLE PUMP

With domestic allowables and markets as they are, the trend is toward slim-holes . . . for completing in new areas . . . for marginal wells . . . and for fully exploiting pays that are on the verge of depletion. Little Squirt Pumps have been carefully designed to afford all of the operating advantages desired in small-volume production . . . with the stamina and dependability of regular-sized pumps. Whether you complete single- or multiple-string, there's a Little Squirt available . . . four in rod pump sizes, including hollow rod types, and five tubing pump sizes, with metal or cup plungers.

Try a Little Squirt in your next slim-hole. It's another pump that Harbison-Fischer has designed for a special application that you can run with confidence—because you know that Harbison-Fischer will stand behind it. Ask your store, or write to P.O. Box 2477, Fort Worth, for illustrated literature. There's no obligation, of course.

HF

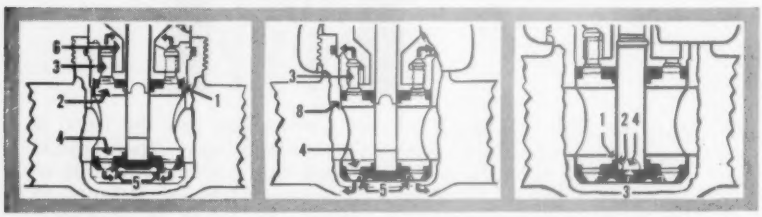
"BEST PUMPS IN THE OIL PATCH"®

HARBISON-FISCHER MFG. CO.
FORT WORTH

Seals DROP-TIGHT without "bumping"

Positive sealing under the highest line pressures—*with minimum torque*—makes the Demco MUD KING your best buy for every mud line application . . . for water flooding, hydra-frac, acidizing and cementing service . . . and for many production applications.

Demco's secret lies in its unique one-unit seal assembly, with its patented spread-ring construction. Here's how it works . . .



A. Resilient seat assembly (1) is reinforced with steel wear rings (2), having integral projecting pins at top (3) and bottom (4). In normal contracted position, the seat assembly is easily inserted in, removed from the body. Until the seat assembly is bottomed, the steel spread ring (5) does not act upon the lower projecting pins, nor do the bonnet legs (6) act upon the upper pins.

B. With the bonnet down and the seat assembly bottomed, the spread ring (5) has forced the lower projecting pins (4) outward. Similarly, the upper pins (3) have been wedged outward by the descending bonnet legs, providing a tight seal between body wall (8) and seat, preventing entrance of abrasives between seat and body wall.

C. As gate is closed, leading edge of gate slides past wear ring (1), contacts rubber ring (2) for positive rubber-to-metal seal. Seal occurs before gate touches rubber cushion (3), eliminating need for "bumping." Relief in bottom of gate (4) allows straddling of solid particles that might interfere with proper closure.

At Supply Stores Everywhere!

DRILLING EQUIPMENT MANUFACTURING CO.

Oklahoma City, Oklahoma

DRILLING EQUIPMENT MFG. CO. DEMCO OKLAHOMA CITY, OKLA. U.S.A.

22-July 1 University of Michigan, engineering summer conference, topics in multiphase flow, Ann Arbor, Mich.

25-29 Petroleum Equipment Suppliers Association, annual meeting, Banff Springs Hotel, Banff, Alta.

25-July 5 First International Congress for Automatic Control, Moscow, USSR.

26-28 North American Gasoline Tax Conference, annual meeting, southern region, Eden Roc Hotel, Miami Beach.

26-July 1 American Society for Testing Materials, annual meeting and exhibit, Chalfonte-Haddon Hall, Atlantic City, N. J.

27-28 Michigan Gas Association, Mackinac Island, Mich.

JULY

11-20 University of Michigan, engineering summer conference, applied mathematics for chemical and metallurgical engineers, Ann Arbor, Mich.

18-29 Massachusetts Institute of Technology, dynamics and control of chemical engineering processes program, Cambridge, Mass.

28-30 American Petroleum Institute, Division of Production, Eastern district meeting, The Greenbrier, White Sulphur, Springs, W. Va.

AUGUST

3-5 Wyoming Geological Association, field trip to Snyder basin and Wind River Mountains, Casper.

14-19 National Congress of Petroleum Retailers, Inc., annual session, Shamrock-Hilton Hotel, Houston.

15-17 American Society of Mechanical Engineers, American Institute of Chemical Engineers, heat transfer conference and exhibit, Statler Hilton Hotel, Buffalo, N. Y.

15-26 Sacramento State College, summer institute on nondestructive testing, Sacramento, Calif.

22-26 Gordon Research Conference, catalysis, Colby Junior College, New London, N. H.

29-31 Appalachian Gas Measurement Short Course, University of West Virginia, Morgantown, W. Va.

30-Sept. 2 American Association for the Advancement of Science, Alaska Division, eleventh Alaskan science conference, Anchorage.

SEPTEMBER

6-7 Chemical Institute of Canada, organic chemistry division conference, Edmonton.

7-9 American Society of Mechanical Engineers, joint automatic control conference, Massachusetts Institute of Technology, Cambridge, Mass.

7-10 Billings Geological Society, annual field trip, Hebgen Lake-Madison Valley area of southwestern Montana.

8-9 National Research Council, Chemical Institute of Canada, tenth Canadian high polymer forum, Alpine Inn, Montreal.

8-9 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.

8-10 Chemical Institute of Canada, western regional conference, Regina.

8-10 Intermountain Association of Petroleum Geologists and Eastern Nevada Geological Society, field trip, economic geology of east-central Nevada.

11-16 American Chemical Society, national meeting, New York City.

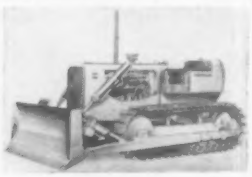
14-15 Western Petroleum Refiners Association, Rocky Mountain regional tech-

WHY GEORGE PEASE USES

D6s for SITE PREPARATION

THIS is one of 60 sites recently prepared by George W. Pease for a large oil company. The location: Osage County, Oklahoma. The job at each site: leveling an area about 85 feet x 130 feet for drilling rig and equipment and digging a slush pit 70 feet square and 5 feet deep. Depending on conditions, it took the Cat D6 Tractor with No. 6S Bulldozer from one to three days to prepare a site.

Why did George Pease choose the D6? An important reason, he'll tell you—"It stands up better than competitive machines." His is no snap judgment, for he's a veteran with 16 years' experience in the business. Ask others like him, who make their living in the same kind of tough work, and you'll hear the same verdict on the D6.



NOW THE NEW D6 SERIES B

Stacked against the previous model—or against any tractor of comparable size—the new D6B is even further out front from every angle: greater production, low-cost operation and time-saving maintenance. Some reasons why:

NEW ENGINE—A Cat D333 Diesel Engine (93 flywheel HP) delivers 25% more lugging ability. New direct-acting governor for quick fuel adjustments handles loads faster.

NEW INTEGRAL HYDRAULIC SYSTEM—Under-the-hood mounting of tank, pump and valves permits convenient routing of hydraulic lines to bulldozer or implement cylinders, frees front and rear for other equipment.

NEW OPERATOR CONVENIENCE—An all-new cockpit has coordinated controls that make the tractor operate almost as if it knew what was needed next.

NEW 8-FOOT BULLDOZER BLADE—This shorter straight blade combines productive capacity with narrow width. No highway permit is required to move machine from job to job.

And that's not all. The new D6B also features dry-type air cleaner, hydraulic track adjusters (optional), lifetime lubricated track rollers, the oil clutch and forward-reverse lever. Get the full details from your Caterpillar Dealer. Ask him to *show* you how the new D6 can step up production on your job!

Caterpillar Tractor Co., General Offices, Peoria, Illinois, U.S.A.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

MODERN HEAVY-DUTY MACHINES FOR THE HARD WORK

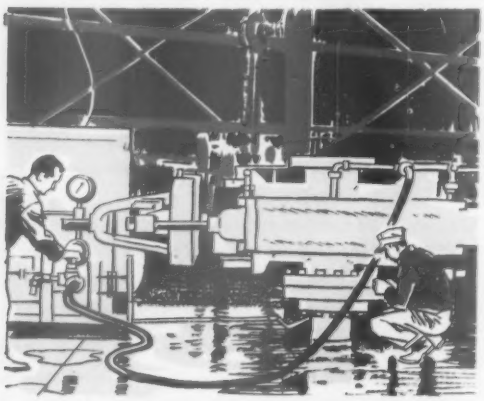
ANOTHER
HOMCO ASSOCIATED
RENTALS REPORT

"I use the Homco-Associated rental service the way I do a bank – and it saves me money"

Houston drilling contractor says:

"I've been renting tools and equipment from the people at Associated for years — throughout the oil country, from Harvey, Louisiana, to Casper, Wyoming. We use some of their equipment on every job."

"We all know from experience that money we have tied up in seldom used equipment is almost money lost. It wastes operating capital and cuts profits. Homco-Associated always has the tools and equipment, and they are handy. With more than 55,000 items available for rental, they have the largest selection of oil field equipment in the world for rental use."



1. Every rental item is completely overhauled and tested before use.

HOMCO

HOUSTON, TEXAS (HEADQUARTERS)

HOMCO

ASSOCIATED OIL FIELD RENTALS

HOMCO ALSO OFFERS

Electrical Well Services

Fishing & Cutting

Directional Drilling

Complete Supply Service

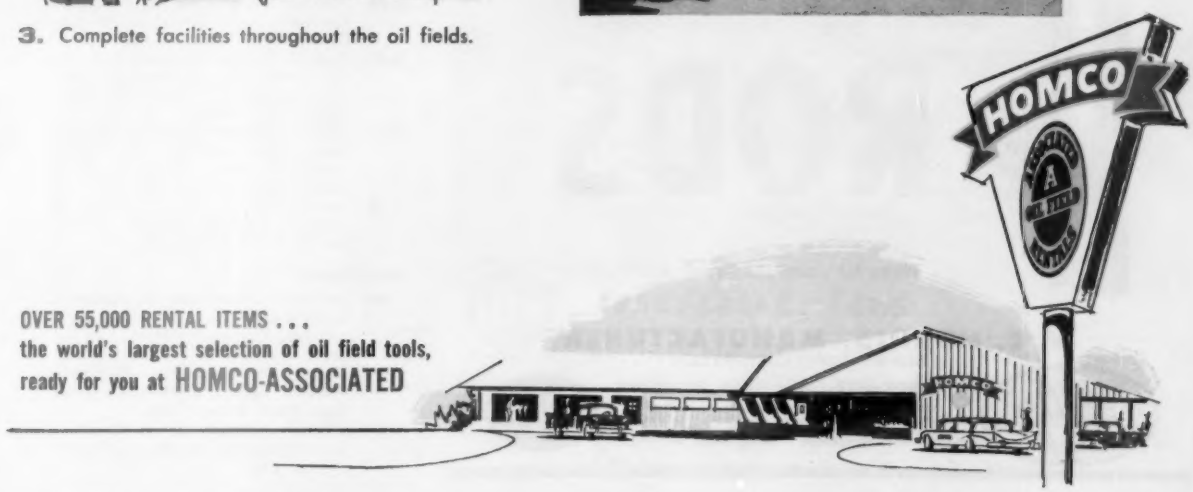
2. The most complete stock of oil field rental equipment in the world.

4. Pricebook contains complete engineering and specification tables. Available to operators on request.

Typical of the items available are: the HOMCO Power Swivel, the HOMCO Mud-Miser, blowout equipment, drill collars, and drill pipe.

3. Complete facilities throughout the oil fields.

OVER 55,000 RENTAL ITEMS . . .
the world's largest selection of oil field tools, ready for you at HOMCO-ASSOCIATED



nical-industrial relations meeting, Henning Hotel, Casper, Wyo.

14-16 National Petroleum Association, annual meeting, Traymore Hotel, Atlantic City, N. J.

15 Natural Gasoline Association of America, Rocky Mountain regional meeting, Palliser Hotel, Calgary.

15-16 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual engineering management conference, Morrison Hotel, Chicago.

18-21 American Society of Mechanical Engineers, petroleum mechanical engineering conference, Jung Hotel, New Orleans.

19-21 Texas Mid-Continent Oil and Gas Association, annual meeting, Hilton Hotel, San Antonio, Tex.

21-23 Pacific Coast Gas Association, annual meeting, Westward Ho Hotel, Phoenix.

25-27 American Association of Oilwell Drilling Contractors, annual meeting, Roosevelt Hotel, New Orleans.

25-28 American Institute of Chemical Engineers, meeting, Mayo Hotel, Tulsa.

25-28 American Institute of Electrical Engineers, petroleum industry committee, electrical conference of the petroleum industry, Hotel Skirvin, Oklahoma City.

26-29 American Welding Society, fall meeting, Penn-Sheraton Hotel, Pittsburgh.

26-30 Instrument Society of America, instrument-automation conference and exhibit, and fifteenth annual meeting, Coliseum, New York.

29-30 Mid-Continent Oil and Gas Association, Mississippi-Alabama division meeting, Grand Hotel, Point Clear, Ala.

Service with ACTION

WHEN YOU SPECIFY-

W.C. NORRIS SUCKER RODS

Write for complete Sucker Rod Bulletin

W. C. NORRIS, MANUFACTURER
DIVISION OF DOVER CORPORATION
P. O. BOX 1739 • TULSA, OKLAHOMA
BRANCHES: Great Bend, Kansas; Corpus Christi, Houston, Kilgore, Odessa, Wichita Falls, Texas; Oklahoma City, Oklahoma; Salem, Illinois; Casper, Wyoming; Farmington, New Mexico; Edmonton, Alberta, Canada.

NORRIS QUALITY
SUCKER RODS
POLISHED RODS COUPLINGS

Buy From Your NORRIS Distributor

OCTOBER

2-5 Society of Petroleum Engineers of AIME, annual fall meeting, Denver.

3-4 Independent Natural Gas Association of America, annual meeting, Fontainebleau Hotel, Miami Beach.

6-7 National Association of Corrosion Engineers, annual western region conference, Sheraton-Palace Hotel, San Francisco.

6-8 National Association of Corrosion Engineers, southeast region conference, Dinkler-Plaza Hotel, Atlanta, Ga.

6-8 National Academy of Sciences, National Research Council, ninth national clay conference, Purdue University, Lafayette, Ind.

10-12 American Gas Association, annual convention, Atlantic City.

11-14 National Association of Corrosion Engineers, northeast region conference, Prichard Hotel, Huntington, W. Va.

12-14 Southwestern Federation of Geological Societies, annual meeting, Wooten Hotel, Abilene, Tex.

13-14 California Natural Gasoline Association, annual fall meeting, Hotel Miramar, Santa Monica, Calif.

13-16 Taft, Calif., Oildorado, fiftieth anniversary celebration.

17-19 American Society of Mechanical Engineers, American Society of Lubrication Engineers, lubrication conference, Statler Hilton Hotel, Boston.

17-19 University of Minnesota, Pennsylvania State University, Colorado School of Mines, biannual symposium on drilling and blasting, Golden, Colo.

19-20 National Association of Corrosion Engineers, north central region conference, Schroeder Hotel, Milwaukee.

19-21 Gulf Coast Association of Geological Societies, convention, Biloxi, Miss.

19-21 Rocky Mountain Oil and Gas Association, annual convention, Brown Palace Hotel, Denver.

20-23 Odessa Oil Show, Odessa, Tex.

23-25 Independent Petroleum Association of America, annual meeting, Statler-Hilton Hotel. Dallas.

24-25 American Society of Mechanical Engineers, American Institute of Electrical Engineers, fuels conference, Daniel Boone Hotel, Charleston, W. Va.

25-28 National Association of Corrosion Engineers, south central region conference, Mayo Hotel, Tulsa.

26-27 Armour Research Foundation of Illinois Institute of Technology, computer applications symposium, Morrison Hotel, Chicago.

26-27 Western Petroleum Refiners Association, annual question and answer session of refining technology, Rufus Garrett Hotel, El Dorado, Ark.

28 Natural Gasoline Association of America, southern regional meeting, Carlton Hotel, Tyler, Tex.

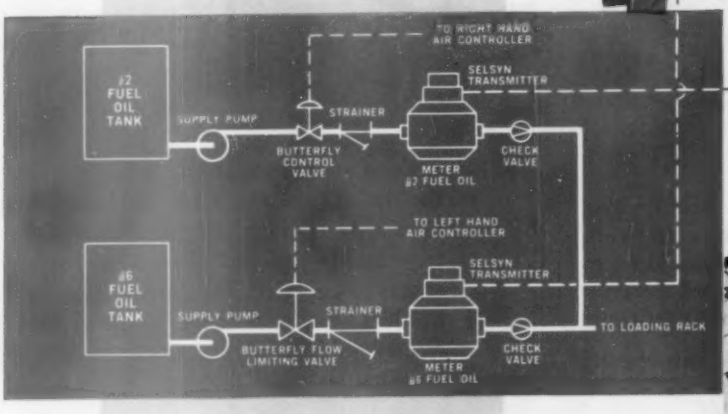
NOVEMBER

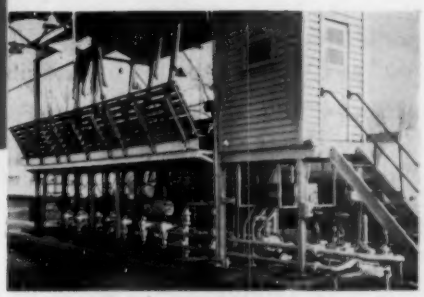
3-4 American Association of Petroleum Geologists, Pacific section, annual meeting, Ambassador Hotel, Los Angeles.

3-4 Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.

6-9 Chemical Institute of Canada, chemical engineering division, conference, Quebec City.

ONE BLENDER REPLACES INTERMEDIATE TANKAGE





BIF *Proportioneers*

continuous, automatic in-line blender cuts tankage needs, reduces costly time losses!

Compact Proportioneers system permits simultaneous delivery of #2 and #6 fuel oil and *any intermediate grade* . . . using minimum tankage. A twist of a dial meets individual customer requirements . . . faster . . . safer . . . at savings up to ½¢ per gallon.

Remote control features completely explosion-proof wiring . . . permits location of control equipment in dispatchers office, installation of meters and valves with minimum disturbance to existing piping. Performance-proved, totally integrated system promotes maximum production from existing personnel and real estate . . . reduces inventory requirements . . . lowers taxes. Operation "fail-safe" under all conditions. Excellent repeatability. Written *guaranteed accuracy!*

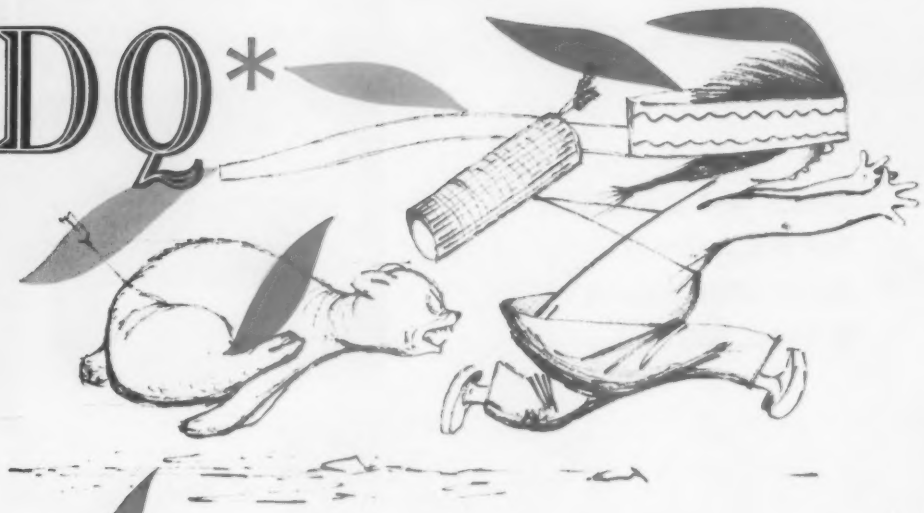
BIF *Industries*

BUILDERS-PROVIDENCE • PROPORTIONEERS • OMEGA

METERS • FEEDERS • CONTROLS / CONTINUOUS PROCESS ENGINEERING

Write for complete data. B-I-F Industries, Inc., Dept. P 377 Harris Avenue, Providence 1, Rhode Island

PDQ*



Pretty dern quick!

That's the kind of service you want. And when you choose Welex to complete your well, that's the kind of service you get. Like the papoose above, our crews hit the ground "a runnin" and wrap up the job in a minimum of time.

But to Welex, PDQ means more than speedy service. Here's the difference that makes Welex well completion services outstanding:

*P—Penetration

Penetration means Welex jet perforating. This is the most important factor in successfully completing a well. Whether you choose the 5-inch Super Dyna-Jet[1] for standard completions or the power-packed Sidewinder[1] for a 2-inch tubingless completion or one of the many other types and sizes of jet guns, you get deepest penetration. Welex's continuous laboratory and field testing and research guarantee you deeper penetration every time with the maximum flow index.

*D—Developments

New developments from Welex's research facilities have a way of soon becoming standards of the industry. Just as the Swing-Jet[1] and Link-Jet[1] opened new horizons in throughtubing completions, new tools presently in development stages soon will be introduced in the field. These will mark another first by Welex in offering the finest proven well completion tools.

*Q—Quality

Quality is Welex. Quality well completion services from Welex assure you that your well is in good hands. Welex equipment, developed by the industry's finest research facilities, and Welex engineers, backed by years of experience, form a combination that can turn a million dollar gamble into a sure winner. Why settle for less than the best? That's Welex, the company that originated jet perforating —the company that offers a complete selection of well completion services for every type of well.

Next time and every time call your Welex representative for top completion services "PDQ."

WELEX, INC.

ORIGINATORS OF Welex JET PERFORATING

General Offices: 1400 East Berry, Fort Worth, Texas
In Canada: Welex of Canada, Ltd.
[1]*Trade Marks of Jet Research Center, Inc.*

50 years ago

June 16, 1910

The Texas Co. boosts capital stock from $18,000,000 to $36,000,000 with plans to build new refineries at Corsicana, Tex., and at some point near booming Caddo field north of Shreveport, in northwestern Louisiana. Additional appropriation of $700,000 authorized for new fuel-oil plant being built at Tulsa. Proposed new plants to give company total of six refineries.

Miami, Okla., which refused Quapaw Gas Co., a franchise when that company was laying its recently completed gas line from Caney gas field, north of Bartlesville, to Joplin, Mo., enters court proceedings to compel the company to supply the town with gas.

Rapidly mounting production and difficulties of building additional storage are causing operators to curtail drastically planned drilling programs in California's large and booming Coalinga field. Traders Oil Co. cancels plans for 25 wells.

25 years ago

June 13, 1935

California oil producers, 800 strong, in emergency meeting at Los Angeles following the Supreme Court's recent invalidation of the National Industrial Recovery Act (NRA), pledge support to a voluntary and cooperative program of production curtailment.

Canadian Government sends out more than 180 geological parties in launching a newly adopted widespread and intensive exploration program. Appropriation of $1,000,000 earmarked for project.

Completion by Ohio Oil Co. of 12,000-bbl. oil well at its 3 State McDonald, 4 miles south of Eunice field, in Lea County, southeastern New Mexico, creates new sensation in state's oil industry. Operators speculate on whether new well, productive at 3,785-3,816 ft., is long extension of Eunice, or discovery of new major field (South Eunice field).

10 years ago

June 15, 1950

George Vasen's 1 Fee wildcat northeast of Wiggins, in Stone County, Mississippi, cores below 17,000 ft. to pass Gulf Coast drilling depth record of 16,665 ft. set by Phillips Petroleum Co. in 1944 at its 3 Schoeppe, on Millican dome, in Brazos County, Texas.

H. H. Hewetson, Imperial Oil Ltd. chairman, predicts Canadian oil production will more than match country's needs by 1958. Interior plains region of western Canada is expected to prove up 5,000,000-bbl. reserve.

Venezuela production climbs to new all-time high of 1,512,700 bbl. daily, and first time above 1,500,000 bbl.

JOURNALLY SPEAKING

After 50 Years

HAPPY BIRTHDAY to us!

Fifty years ago this week the Big Yellow Book was first published under the name of The Oil and Gas Journal, with a weekly frequency, from headquarters in Tulsa, and under its present ownership.

For 8 years previously it had carried the title of Oil Investors Journal and had been issued twice a month, first from Beaumont, where it was born during the Spindletop boom, and later from Houston.

The first issue under the new format was printed as Volume IX, No. 1, and dated Thursday, June 16, 1910. It had 28 pages. The pages were about one-third larger than at present, and the type size was about one-third smaller.

The lead editorial was a "Publishers' Announcement," which in the rather quaint journalistic style of that day, laid down some policies that half a century have proved sound and prophetic.

We'll quote a few.

"The Oil and Gas Journal essays to print regularly reliable reports from every state and district in the United States where oil and gas are produced.

"To do this it is necessary to have a personal representative who knows something of the practical end of the oil business to prepare the report so that producers, pipeline, and refinery people will understand at a glance that it is real oil field news.

"This effort means a large staff of field reporters, to the end that what might have been otherwise impossible may be obtained and the thousands of people engaged in the oil and gas industry will be able to secure, at a minimum cost, a fairly complete record and history of the business.

"The cost of maintaining a trade journal of this character is heavy and continuous, but it is confidently believed by the publishers that the trade needs such a representative paper and will be glad to have an opportunity to subscribe for and advertise in it. If this belief is warranted there can be no question about the financial success of The Oil and Gas Journal.

"The editorial and business offices of The Oil and Gas Journal are located near the busy center of Tulsa. Everyone is welcome to come and go at will and the visit will be appreciated at all times, for only by personal intercourse can all the news and notes and valuable gossip of the industry be secured.

"It is believed that the quantity, quality, and value of the matter contained in The Oil and Gas Journal will equal if not surpass that of any other trade journal printed."

Sound and prophetic statements. Half a century has brought many changes to the oil business and to the Journal, but some things remain the same.

We are still near the busy center of Tulsa but now you have to go to 211 South Cheyenne to get in the front door, because in the interim we have expanded our premises to cover a quarter of a block.

But everyone is still welcome to come and go at will, and the visit will be appreciated at all times. We still like to get "valuable gossip of the industry" from oil men.

We still "essay to print regularly reliable reports," written by people "who know something of the practical end of the oil business," and presented in such a way that everyone in the industry will "know at a glance that it is real oil news."

Now as then it requires a large staff of reporters to secure "a fairly complete record and history of the business," but it is still true that "the trade needs such a representative paper." And, fortunately, the publishers were correct in their prediction that people in the industry would be "glad to have an opportunity to subscribe for and advertise in it."

And, after 50 years, it is still our belief that "the quantity, quality, and value" of the matter contained in The Oil and Gas Journal surpasses that of any other publication.

Happy birthday to us.

—Henry D. Ralph

BAKER WIRE LINE BRIDGE PLUG, PRODUCT 400-N

RELIABLE BRIDGE PLUG

In average wells or tough ones, its dependability is a matter of record.

Here is a bridge plug that commands a lot of respect. The evidence has been piling up for years that this is probably the most dependable bridge plug available anywhere.

It's got time on its side. Over the years we've refined it into a tool with a tremendous ability to take whatever comes its way downhole.

Whether you measure its life span in hours or in years, a Baker Bridge Plug masters the hydraulic forces in any well—from average wells to the hot, high pressure wells. Reliable is the right word for it.

Leading wire line companies set Baker Wire Line Bridge Plugs accurately and promptly. Other models can be set on tubing or drill pipe. They're made in drillable cast iron for permanent service, and in fast-drilling magnesium for temporary service.

BAKER

BAKER OIL TOOLS, INC. HOUSTON / LOS ANGELES / NEW YORK

Don't look now, but we may be nearing bottom

THINGS ARE BEGINNING to look just a little bit better in the marketing end of the oil business—the end that brings in all the money and calls the tune for activity in the rest of the industry.

Consumer demand is fair-to-middling, products stocks are not quite as excessive as they were 3 or 4 months ago, and market prices in some areas are stiffening up a trifle.

But these add up to just a tiny break in the clouds—not a sign that the storm is over. If the industry misinterprets the signals and doesn't keep its sails close-reefed it will still be in danger of foundering.

APPARENTLY MANY REFINERS have taken to heart the advice to aim for profitable sales rather than maximum gallonage. For 3 months now total runs have averaged below 8,000,000 bbl. per day—a figure that has come to be considered the danger point.

Deeper cuts would have been more in line with the seasonal drop in demand, but even so a little of the top-heaviness has been worked off of products stocks. And at least some refiners, discovering that they could buy products cheaper than they could make them, have siphoned off some of the surpluses of other plants with the result that there is somewhat less distress merchandise on the market than during the early spring.

The stock situation itself is encouraging, but nothing to cheer about yet. Gasoline stocks are getting down closer to last year's level and distillate stocks are somewhat below it. But last year's stocks were too high, so not a satisfactory bench mark.

Demand this summer apparently will be a little bit higher than last summer. But not enough higher to suggest that refinery runs should be allowed to creep above the 8-million mark before Labor Day.

As for crude oil, this translates into practically no increase in demand for several months. Though production has fallen steadily since February, crude-oil stocks are some 10,000,000 bbl. above a comfortable level for this season.

THIS ALL ADDS UP to an indication that things are not getting worse with the oil business. Not that they are vastly improved; just that they are not getting worse.

What happens next depends on whether the industry continues its self-medication during the summer.

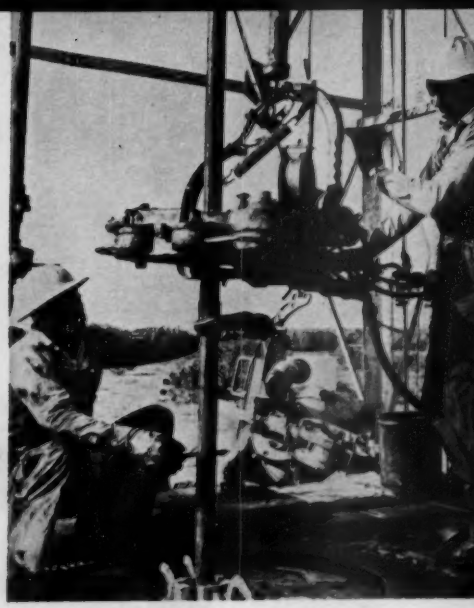
If crude production remains close to its present rate, if refinery runs don't climb, if the volume of distress products shrinks significantly, then product prices may move up to a reasonably profitable level. Then the downward pressure on crude postings may be relieved.

Then it will look as though the oil industry has learned Lesson No. 1 in how to live with surplus capacity.

In production equipment, quality is the only key to extra service, reduced final costs....

Quality Equipment Cuts Costs

Cabot Catalog 60 gives you complete specifications on the new Equalign and the Equalastic Adjustable Crank Balanced Series and the Beam Balanced Series. Each Cabot Series has advantages worth your study and consideration; advantages based on minimum maintenance and dependable performance. Call your J&L Supply man for complete information.



J&L Tubing (upper right) plus Axelson Bottom Hole Pumps and Sucker Rods point the way to production economy. The extra service and reduced maintenance of quality equipment assure lower real costs.

J&L offers a complete line of casing and tubing, including special designs for problem production.

Fast dependable service is available from J&L pump shops to back up your investment in quality.

Our Shreveport district office and store (below) is one of many well stocked locations ready to serve you. For quality equipment to cut your real costs ... see your local J&L man ... and save.

Jones & Laughlin

SUPPLY DIVISION – Tulsa

If it's sold by J&L....
It's the best available

110

A $3 billion organization with 285 branches covering the oil provinces alone, Canada's First Bank is uniquely equipped to assist your Canadian oil or gas operation.

"A Guide for Oil & Gas Operators in Canada", 40-page handbook published by the B of M is yours for the asking. Write on your business letterhead to John A. Baines, Mgr., Oil & Gas Dept., 140 Eighth Ave. West, Calgary, Alta., Canada—or our nearest U. S. office.

NO STOCK RECOMMENDATIONS

While the Bank is prepared to provide all available information on the oil industry, it does not make recommendations regarding the purchase of individual oil stocks.

"MY BANK" TO 2 MILLION CANADIANS B of M

BANK OF MONTREAL

Canada's First Bank Coast-to-Coast

BRANCHES IN ALL TEN PROVINCES

District Headquarters:

Halifax, Toronto, Winnipeg, Calgary, Vancouver

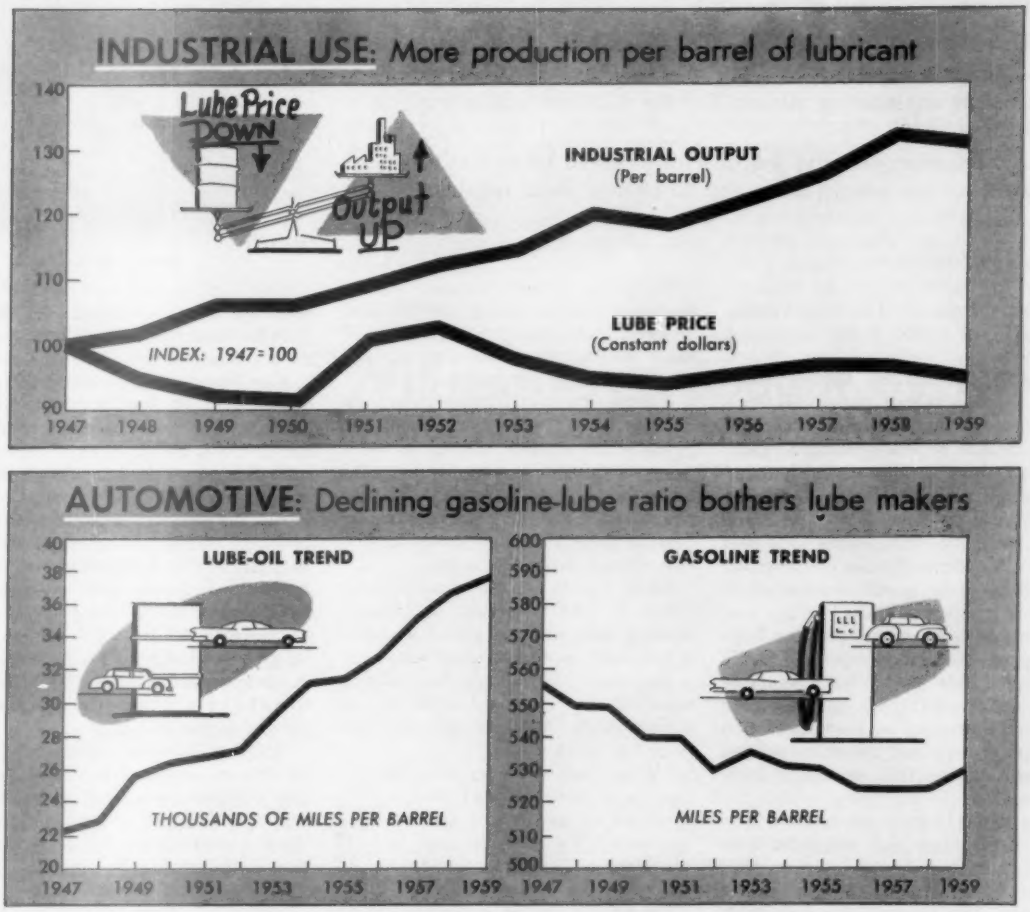
NEW YORK: Two Wall St. • SAN FRANCISCO: 333 California St.

CHICAGO: Board of Trade Bldg., 141 West Jackson Blvd.

Head Office: Montreal

800 BRANCHES IN CANADA, UNITED STATES, GREAT BRITAIN AND EUROPE

RESOURCES EXCEED $3,000,000,000


INDUSTRIAL USE: More production per barrel of lubricant
Lube Price DOWN
Output UP
INDUSTRIAL OUTPUT
(Per barrel)
LUBE PRICE
(Constant dollars)
INDEX: 1947=100
140
130
120
110
100
90
1947 1948 1949 1950 1951 1952 1953 1954 1955 1956 1957 1958 1959
AUTOMOTIVE: Declining gasoline-lube ratio bothers lube makers
LUBE-OIL TREND
THOUSANDS OF MILES PER BARREL
40 38 36 34 32 30 28 26 24 22 20
1947 1949 1951 1953 1955 1957 1959
GASOLINE TREND
MILES PER BARREL
600 590 580 570 560 550 540 530 520 510 500
1947 1949 1951 1953 1955 1957 1959

These graphs show why lube salesmen wear furrowed brows. Their plaint . . .

Lube Sales Lagging Gasoline's Growth

THERE'S a bittersweet aspect in the lube outlook.

Demand is increasing—but slower.

Prices for lube crudes are high and may go higher, but the profits on lube-product sales are too slim.

And the big worry of lube salesmen still persists: The ratio of motor-oil sales to gasoline sales is not improving. That's an indication that lube sales are not what they should be.

The latest estimate of lube consumption, made by James A. Coble, economist for Socony Mobil Oil Co., sets total 1960 consumption of lubricants, including additives, at 123,900 bbl. daily, up 2.7% over 1959. Domestic consumption alone is estimated at 120,000 bbl. daily, up 2.6%.

These gains, however, don't match the spectacular gains of 1959. Last year's total consumption of 120,600 bbl. daily was a 5.4% jump over 1958. Average domestic demand of 117,000 bbl. daily was an 8.3% increase.

Key to any improvement in the lube-oil picture is industrial activity.

Last year industrial demand jumped 11.5% to a total of 17,854,000 bbl. This year the increase is estimated at only 4.3%, sending the yearly total to 18,628,000 bbl.

Automotive consumption is still the area for large volume sales, but the market is almost static. Consumption this year is expected to reach 26,588,000 bbl. for a 1.6% increase. Consumption last year was 26,169,000 bbl. which represented a 1.7% increase.

Prices . . . The pressure from increased demand is illustrated in the price activity of Pennsylvania-grade crudes.

These highly regarded lube crudes have enjoyed a 30-cent per barrel price advance since the first of the year—a 15-cent advance in January and a similar jump in April.

The top price for Pennsylvania-grade crude now is $4.70 a barrel for

An approach:

"The lubricant segment of the oil industry needs to begin thinking of itself as provider of lubrication insurance, rather than makers of lube oil," says Socony Mobil Economist James A. Coble.

This means, according to Coble, stepped-up efforts to:

. . . **Give more service.** For the industrial customer, more competent engineering advice. For the motorist, easier ways to buy lubes.

. . . **Do more effective job** of letting people know it's in their interest to use quality lubes and to change them regularly.

James A. Coble

Bradford district oil. This ranges down to $4.25 for crude from Southwest Pennsylvania.

Some crude buyers believe these prices may go higher under influence of increased demand plus shortages being created by low production rates of Texas lube crudes under reduced allowables. This price rise is putting the squeeze on lube makers. One major recently was forced into the market for Pennsylvania-grade crude to cover a large government contract which it fulfilled at a loss.

This points up what has been happening in the lube business. Coble explains it this way: "We have done such an effective job of providing efficient lubricants at low prices that we have not gained the sales volume and unit profits that we might have expected.

"As the efficiency of our products and the machines that use them goes up, the customers' need for them goes down—with the result that, in the last 15 years, the demand for lubricants has been leveling off, even though the use of mechanical energy has grown by leaps and bounds.

"To make matters worse, the prices we get for our products are little if any higher, even while the products have been greatly improved."

Lubes lagging . . . There has been a rapid increase in the efficiency of lubricants over the past 12 years.

The motorist today drives nearly twice as many miles on a barrel of lubricant as he did at the end of World War II. During the same period his mileage from a barrel of gasoline has remained practically the same.

The picture in industrial lubes is similar. Industrial customers also are getting a bargain. The volume of industrial output for each barrel of lubricants used has been rising rapidly.

The comparative statistics: In 1953 motorists got about 29,000 miles per barrel of motor oil and about 540 miles for each barrel of gasoline. But last year motorists got nearly 38,000 miles per barrel of motor oil and about 530 miles per barrel of fuel.

For the industrial consumer, his output per barrel of lube was measured by an index number of 115 in 1953, using 1947 index as 100. By 1959 the output index per barrel of lube used rose to 132. But the price of these industrial lubes, stated in constant dollars, shrank from 98 to 96.

Coble points out this means "every gallon of lubricants used in industry is doing more and more work and thus is becoming more and more valuable."

He adds: "We should be realizing some of that increased value in our selling price, but instead, the real price has gone down."

"When you consider that lubrication is a form of insurance against wear-out of equipment and wasteful operation, it's obvious that we are providing our customers with good insurance at bargain prices.

"It should not be necessary for us to throw in our profits as a bonus. Yet that is just what is happening in our business because of the fierce price competition. Instead of selling quality lubrication and the service that should go with it, many companies have been selling lubricants solely on price."

Changing trends . . . Coble estimates the outlook for lubricant demand hinges on four factors:

. . . **Export demand.**

This market faces restrictions because of the increasing capacity for making lubes abroad and of the Russian entry into the world lube market. American lubes enjoyed a good business abroad last year primarily due to the stepped-up industrial activity. This is expected to ease off this year.

. . . **Use patterns in vehicles.**

Different types of engines may be developed, Coble points out, but the automobile industry is still betting heavily on the internal-combustion engine. This leaves the real sore thumb of lubrication business with the motor-oil drain interval.

The lengthening of this interval in actual practice has been the prime contributor to the declining motor-oil ratio, Coble says. Many motorists have fallen in with car makers' recommendations of 4,000-mile intervals.

But the true economy of more frequent oil changes is becoming evident to many in the sudden increase in rebuilding of engines and ring jobs.

Coble says the industry should unite to convince motorists it is in their own interest to change their oil more often. A companion campaign should be one to make an oil change easier and faster for the motorist.

Another trend of concern to lube makers is the dramatic rise of American compact cars. But their smaller needs are just part of the trend toward smaller crankcases, fewer grease fittings, and plastic bearings.

. . . **Industrial production.**

Lubricant demand usually moves up with industrial production. And in the long run the expected future rise in business activity will favor lube demand. A large part of the 1959 demand gain thus can be attributed to recovery from recession, and the bulge in business this January reflected inventory replacement after the steel strike. The rest of 1960 should be above 1959 levels.

Coble warns, however, that industrial activity is above its long-term trend. Experience has shown that when this occurs businessmen should prepare for the day when activity again will slump.

. . . **Competition** from nonpetroleum lubricants.

The long-term impact may be significant from plastic bearings, auto chassis that requires no grease, possible permanent-fill lubrication, synthetic lubes, compressed air as a lube, and increasing use of nonpetroleum additives in regular lubricants.

Kansas Producers Fight for Use of Derby Line

• The independents have asked that the status of the company's line be switched to common carrier.

CENTRAL Kansas producers, victors in early skirmishing with Derby Refining Co. over a crude-price cut, are now laying siege to Derby's pipeline.

The line has become a vital factor in the producers' drive to find another market for their crude and reopen the 544 shut-in wells in 40 fields near Wichita.

The wells were shut down on order of the Kansas Corporation Commission at request of the producers. They wanted to quit selling crude to Derby, the only purchaser, because the refiner cut crude prices from $3.05 to $2.85 per barrel.

The issue may reach a climax June 24. That's the date set by the Kansas commission to hear the petition of producers that Derby's line be declared a common carrier.

Derby maintains the line is a private plant facility and on that basis refuses its use to the producers.

Find buyers . . . The new wrangle arose after producers made these moves:

. . . Formed a new company, Producers Crude Oil Purchasing, Inc., to market the shut-in crude.

. . . Arranged with two buyers, reportedly Phillips Petroleum Co. and Anderson-Prichard Oil Corp., to take 1,000 bbl. daily each at the old price of $3.05 per barrel. Runs would be distributed pro rata among producers in the afflicted fields. And the oil would be moved on Derby lines to the pipeline hub at Valley Center for trade or final delivery.

Derby refused to take the oil on its south central Kansas line and turned down offers of the producers to buy the line.

That's when the producers petitioned the commission to force the line open to the public as a common carrier and regulate it accordingly.

They contend the line has been and is being used to transport oil for others and that through various exchanges and payments Derby gets about 10 cents per barrel for transportation. The petition declared that exceeds the maximum statutory tariff and asked that the commission also determine proper rates on the line.

The producers also charged that Derby and Colorado Oil & Gas Corp., its parent company, will negotiate with other purchasers to obtain oil while the disputed production is shut in. They allege that such an agreement would constitute an unlawful combination to force a reduction in the price of crude, violating antitrust laws.

Appeal . . . Derby officials made no immediate counter move on the new development.

They announced earlier they planned to appeal the commission shut-in order to district court. W. C. Norman, president of Colorado, also declared Derby would take the case to the highest court necessary to reverse "the arbitrary and discriminatory action."

He said Derby considers the order an attempt to fix the price of crude and constitutes restraint of trade by prohibiting certain producers from selling their crude.

Normal operations of Derby's refinery have not been affected. Ample supplies of crude are available from other sources until production can be resumed in the Wichita area, Derby said.

Wildcat Area Sought by Navy

• About 100 sq. miles off California would be closed to oil operations if Navy's proposal were adopted.

THE LAST promising offshore area yet to be tested off California may have an "Oil Operators Keep Out" sign posted on it.

The Navy is trying to declare the area a "danger zone" due to missile launchings from the Pacific Missile Range.

Restrictions proposed in the area would make oil operations virtually impossible. The Navy failed in an attempt last year to get the land restricted, but it is making a second pitch for "security and safety" reasons.

The area lies off the west coast of Santa Barbara County and includes a 30-mile strip running from Point Sal south to near Point Concepcion. The restrictions would apply to approximately a 3-mile band running along the coast. About 100 square miles is involved, much of it desirable wildcat territory.

The Santa Maria basin, which is productive in the western part of Santa Barbara County, extends offshore over much of the area. The area is the last sedimentary basin along California's coast.

California's biggest concentration of offshore activity is off the south coast of Santa Barbara and immediately east of the area sought by the Navy. Five 3,840-acre tracts brought $55.5 million in bonus bids at a state lease sale last year (OGJ, July 7, p. 72).

The Navy is pressing the issue because it is housekeeper for the missile range. Vandenberg Air Force Base and the Army's Camp Cooke are located on the range. Missiles are fired from both of these spots as well as elsewhere along the coast.

The Navy will permit some navigation in the offshore area under the proposed restrictions, but wants the authority to clear out the area in case a missile is launched. This, of course, would prevent drilling operations.

Oil's objections . . . At a hearing in Los Angeles last week, the Western Oil and Gas Association, the State Lands Commission, and California's attorney general's office opposed the Navy plans.

All said they would eliminate exploration in a potential oil area.

Neal D. Williams, representing the public lands committee of WOGA, urged that any decision be left up to Congress. He cited the Engle Act of 1958 which prohibits the Government from withdrawing more than 5,000 acres without the consent of Congress. Authority of this act should be extended to cover partial use of land as proposed by the Navy off Santa Barbara, he said.

Williams and others said California's best hopes for proving up additional oil reserves lie in the tidelands.

Last year the fishing and boating industries opposed the Navy's plans. However, the Navy has revised its program to satisfy these two groups.

The Corps of Engineers conducted last week's hearings and will make a recommendation on whether the Navy's proposal should be adopted. If the corps decides to go along with the Navy, any appeals will have to be made in Washington.

Two FTC Cases Will Affect Marketers

TWO IMPORTANT cases affecting major oil companies and marketers are currently in the spotlight in hearings before the Federal Trade Commission.

The principal issue in one, the Birmingham case involving Pure Oil Co., is whether a major supplier is guilty of price discrimination if he reduces or eliminates the traditional margin between the price of his gasoline and that of private or unbranded gasolines.

The recent expansion of private and unbranded gasoline sales has made this an increasingly important question.

Another point in the Pure Oil case is whether a supplier can cut prices in a limited marketing area, such as Pure did in Birmingham, Ala., without making similar cuts in all other marketing areas it serves.

The other case concerns contracts between major oil firms and tire manufacturers, and whether some oil companies coerce their retail outlets to handle a specific brand of tires.

The outcome in either case, but particularly the Pure case, could have a substantial impact on traditional marketing practices.

Hearings before an FTC trial examiner began in the Pure Oil case last week. Oral arguments in the tire cases will start next week.

Pure's case . . . The initial FTC charges against Pure stemmed from the company's action in Birmingham where it sold to all its dealers there at a price that would enable them to retail at 1 cent a gallon above unbranded competitors.

Prior to that, the difference in branded and unbranded gasoline had been greater.

FTC charged that this action was unfair competition, aimed at the unbranded dealers. It noted that Pure had not cut its tank-wagon prices elsewhere.

William E. Simon, Pure's attorney, argued last week that since product quality is not an issue, the effect of the FPC action is to prevent a major company from selling essentially the same product at the same price as a competitor.

Simon also pointed out that a company would be put out of business if it had to cut prices everywhere when it makes a price reduction in one area to meet competition.

A Pure official testified that the company makes thousands of price adjustments annually. His point was that obviously a firm shouldn't have to change prices throughout its system each time it makes some local change.

As for injury to competition, another Pure official said that Pure didn't gain gallonage during the price war in Birmingham in 1955-56—but that some other suppliers and some private brand marketers did.

Tire case . . . In the tire cases to be heard next week before the full commission, both the companies involved and the FTC staff will argue—although for different reasons—that the examiner's initial decision was faulty.

In that initial decision, the examiner ruled that there was nothing wrong with the contracts between the major oil firms and the tire manufacturers; that the commissions the oil firms received were earned through their efforts to promote the particular brand of tire involved.

But, the examiner ordered the oil firms to cease any coercion of their retail dealers to handle a particular brand of tires.

In the hearing before the commission, the staff will urge that the examiner be overruled on the contract issue while the companies will seek to have the examiner's cease and desist order set aside.

The oil companies involved are Texaco, Shell, and Atlantic.

Gulf presses imports suit in appellate court

GULF OIL CORP. is determined to press its court test of the residual fuel import allocations as far as possible.

Last week Gulf filed a petition with the court of appeals asking it to reverse a lower court's summary judgment and to remand the case to that court for further proceedings.

The lower court had ruled against Gulf in the initial proceeding after a hearing only on the government's request for summary judgment. Gulf wants a full-fledged trial on the merits of the case.

Gulf is not challenging the residual fuel import control program as such, but Interior Department's administration of it. Gulf contends that Interior's method of basing individual import quotas strictly on the basis of a company's residual imports in 1957 is not fair or valid.

FPC may be short two members for 6 months

THERE IS an increasing possibility that the Federal Power Commission will operate with only three commissioners, instead of five, for the next 6 or 7 months.

Two things make this likely:

The Senate has taken no action to approve the appointments of Thomas J. Donegan and Paul A. Sweeney to the commission.

William R. Connole, the outgoing commissioner, has announced that he will not continue on the commission after June 22 even should Congress pass legislation which would permit a commissioner to stay on the commission until his successor had been approved by the Senate.

If the Senate fails to confirm Donegan and Sweeney before it adjourns, they could serve on an interim basis until a new president makes permanent appointments next year. But it is unlikely that either would give up his present government position to accept a short interim term on the FPC.

So the prospect is that the commission will work with only three commissioners for some time. The three are Chairman Jerome Kuykendall, Arthur Kline, and Frederick Stueck.

Two-man rule? . . . It will be possible, under this circumstance, for major issues to be decided by only two commissioners because they would comprise a 2-1 majority.

Also, since all three of the continuing members are Republicans, there would be no Democratic or independent representation on the commission during that period. This could cause some political squawks.

Conceivably, a three-man commis-

sion might be able to decide issues more rapidly than a five-man commission because it would only be necessary for two of the commissioners to hold the same view.

This "advantage" would be more than offset, however, by the increased workload on the members of a three-man commission.

Connole, in ruling out the possibility that he might continue on the commission until the Senate confirmed a successor, cited personal reasons.

Connole also said he did not want supporters of pending legislation concerning FPC tenure to be put in the position of appearing to be doing so to continue Connole in office after his term expires June 22.

Coal's special fuels study idea is stymied

IT APPEARS more and more likely that a fuels study will be made by an existing congressional committee rather than by a special one the coal industry had sought.

Coal's drive for a special 16-man joint committee has been stymied by a 6-6 vote in the House Rules Committee. Until this deadlock is broken, there will be no House floor action.

Meanwhile, Rep. Wright Patman (D.-Tex.) has announced plans for a study to be made by a group which he heads, a joint congressional economic subcommittee on energy and automation.

He already has put the subcommittee's staff to work investigating federal and state regulatory controls affecting fuels and energy.

Too, he has sent inquiries to all agencies, both state and federal, which handle such regulatory matters.

He said the chief purpose of the inquiries was to determine "the present complex of relationships between owners, producers, distributors, and the several levels and instrumentalities of government" in the energy and fuels field.

He wants each of these agencies to explain what it does, how this fits in with other regulatory groups, and what challenges or conflicts they face.

Finally, Patman wants each of these agencies to suggest ways of improving the role of the federal government to help insure energy resources for maximum production, employment, and purchasing power."

He asked for the comments by no later than September 15, and said no decision would be made on public hearings until later.

watching WASHINGTON

Clyde La Motte

• How much were residual quotas really cut? . . .

INTERIOR UNDER SECRETARY Elmer Bennett was somewhat distressed by the news handling, even by most of the oil press, of the department's announcement of residual fuel-oil quotas for the coming quarter.

The net effect, he feels, was that the stories made Interior's action sound much more drastic than it really was.

Virtually all dispatches from Washington stressed the fact that third-quarter resid quotas were slashed almost 50% below the January-June levels.

Bennett concedes this is true. But he thinks such a comparison is putting the emPHAsis on the wrong sylLAble.

After all, he argues, it is normal for residual imports to rise during the early part of the year and then drop off. Therefore, it is not proper to compare the two periods.

He said a fairer, more accurate picture would have been gained by a comparison of the quotas for the third quarter of this year with the third quarter of the base year for residual imports, 1957. The new quotas are only slightly below imports in 1957.

(Incidentally, the Journal, in its June 6 story, did compare the new quotas with 1957 and with a similar period of another past year—1959, noting that the new allocations run about 15% less than in the third quarter of last year.)

Bennett also points out that actual resid imports during April and May of this year ran at about the same rate as they did during the corresponding months of 1957. He assumes this will continue to be true in June. As a result, he arrives at the conclusion that the industry will be able to get along very well through July, August, and September on quotas nearly the same as 1957 imports.

Despite Mr. Bennett's line of reasoning, it would be hard to convince an importer that the new quotas are not the equivalent of a sharp cut.

• Interior used some tricky emPHAsis itself . . .

Although Interior feels aggrieved over the 50% cut label, the department was guilty of some figure juggling in an effort to minimize the impact of the new residual quotas.

In its announcement of the new allowables, Interior said the third quarter level of 250,000 bbl. daily "compares to 332,427 bbl. daily available for importation in the quarter ending June 30."

The obvious distortion in that type of comparison is that resid quotas for the first half of this year were on a 6-month basis, not a quarterly basis. And since an importer is permitted to bring in his quota at any time during a given period, some of the big importers brought in the bulk of their 6-month quotas during the first 3 months of the year. Naturally this reduced the amount they could bring in during the remaining 3 months.

In trying to duck around the 490,000 figure—the actual level of residual imports during the first 6 months of this year, Interior only succeeded in drawing attention to its efforts to play down the extent of the reduction for the third quarter.

• Coal industry has its own version, naturally . . .

The coal industry is also minimizing the cut, perhaps to forestall a big increase in residual quotas for the last quarter of this year.

A coal press release called attention to the fact that even with the lower figure for the third quarter, residual imports for the entire year will still be well ahead of the 1957 level.

Another case of putting the emphaSIS where you want it.

Halbouty's Crusade Picks up Support

• Houston group organizes to give permanence to their fellow independent's conservation program. They plan to apply pressure on Railroad Commission and Texas legislature for action. Chief aim of campaign is to eliminate small-tract drilling and get allowable based solely on acreage.

SHARP-TONGUED Michel T. Halbouty has been evangelizing throughout Texas for 6 months on behalf of a conservation program that many oil men believe Texas needs.

His "crusade" over, what happens next?

The vocal Houston independent told the Journal last week that if the Texas Railroad Commission refuses to adopt his program, the legislature will be asked to spell it out by law.

Halbouty's fervor on behalf of a plan to eliminate small-tract drilling and to write an allowable formula based solely on acreage is unabated today. And while he considers his personal job of arousing public opinion finished, he is aware privately that it is just beginning.

He has spoken nine times in 6 months in Texas, and there are preliminary plans for a tenth speech—probably the most important of his campaign.

New plan . . . A committee is forming in Houston to give some permanence to his program and carry it to Austin for a showdown before the Railroad Commission and, if necessary, the legislature.

Earl Hankamer, another Houston independent, is the driving spirit behind the move to put the Halbouty program into action. Hankamer's plan is to organize a local committee first and then spread out to other cities.

By autumn there should be enough interest to hold a widely publicized meeting, perhaps at Victoria, Tex., to hear Halbouty speak again and then to move on Austin.

The approach . . . Even in private conversation, Halbouty's voice hits an emotional pitch as he promotes his cause.

He scorns the argument that "little people" will suffer by a plan that eliminates small tract drilling. He speaks of the "leeches" of the oil industry who thrive on speculation and take advantage of loopholes in the law.

He rails at "political expediency" on the Railroad Commission that disregards expert testimony on what it takes to produce a reservoir without waste.

Michel T. Halbouty
"This is a dedicated thing."

The "little people," says Halbouty, are the citizens who suffer when the resources of the state are subjected to "wanton waste" by unwise interpretation of the state's conservation laws.

While he does not single out individuals, there is no doubt that Halbouty's chief targets are the three members of the Railroad Commission—Ernest O. Thompson, W. J. Murray, Jr., and Olin Culberson. Thompson and Murray are both longtime friends of Halbouty, but it is no secret today that the Halbouty campaign has strained this relationship.

The program . . . Halbouty wants, first of all, to make pooling on the established spacing pattern compulsory.

This is essential if a regulatory body is going to prevent waste and protect correlative rights. It would eliminate drilling of unneeded wells in small-tract areas, such as townsites.

With pooling compulsory, unitization on a field-wide basis probably could be achieved voluntarily in almost every proper instance.

Halbouty concedes that compulsory pooling is "the lesser of two evils" and would prefer that no operator be forced to do anything.

But it becomes necessary, he says, because the Railroad Commission has interpreted existing laws in such a way that the small tract operator gets an excessive share of the production.

"If the Railroad Commission in this state set a spacing pattern for a field based on sound engineering principles and at the same time adopted a fair allocation formula based on these data, there would be no necessity for compulsory pooling," he says.

Halbouty's recommendations also embrace this point. He asks for an allocation formula that will give each well and tract its "fair share" of the oil and gas beneath it—and no more.

This would throw out the current formulas which make the well, along with acreage, a factor in the allowable formula.

Halbouty also favors immediate temporary spacing after the discovery well, permanent spacing after sufficient development, and, in general, wider spacing for all fields.

Finally he pleads for general shoring up of conservation laws in all the states to prevent federal laws and controls over the industry.

Port Acres . . . Halbouty cites the Port Acres, Tex., gas field as his favorite example of "shocking" conditions that result of the Railroad Commission's rulings under Texas' Rule 37 (OGJ, Oct. 5, 1959, p. 108).

Thirty-nine applications for small-tract town-lot drilling have won commission approval, and these 39 wells, if drilled, could take 25% to 30% of the reservoir's gas reserves. Yet these 39 wells would occupy only 30 acres in the 3,800-acre field.

These wells can obtain such a disproportionate share of the reserves because the allocation formula grants ⅓ to the well and ⅔ to acreage.

Such a formula—in fact, any arbitrary allocation formula—disregards

From Texans

the principle of ratable and equitable production and "completely sneers at the protection of correlative rights," says Halbouty.

Worse still, it promotes drilling of unneeded wells, endangers town property, and, finally, defeats genuine efforts to cycle the reservoir, maintain pressure, and prevent retrograde condensation. A fight by the small tract owners prevented a pressure maintenance program that would have saved, according to Halbouty, 7 million barrels of condensate.

"You know," says Halbouty, "the one thing that is so hard for me to understand is how, under any circumstances, can the Railroad Commission permit the waste of 7 million barrels of condensate . . . How can any interpretation of any law allow such a decision? As an engineer, I just cannot understand nor condone the sanction of such waste."

Halbouty makes an important point on the Rule 37 exceptions. He does not deny that a man should be allowed to drill a well on his own property. He does make the point that the Commission should not grant an allowable that permits such an operator to drain his neighbor. If the plot is too small to justify sinking a well, compulsory pooling would, in turn, protect the small plot owner from drainage by others.

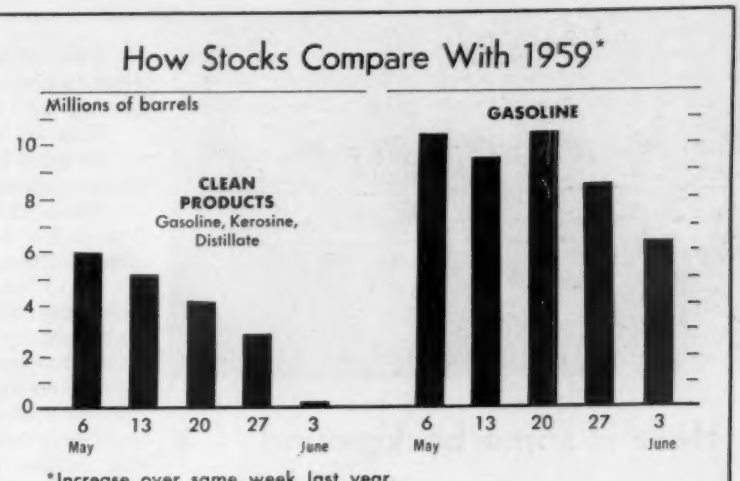
Who's in charge? . . . The Halbouty campaign has created some embarrassment in Texas among oil men who have worked with the Oil Industry Conservation Forum, an organization of independents and majors formed in 1958 to promote wider spacing and other conservation practices.

Halbouty himself is a member of the forum.

But the forum, even its leaders admit, has failed to develop in 20 months a plan of action that will put pressure in the right places and get results. While fundamentally Halbouty and the forum are compatible, the forum has come forward with no concrete proposal.

It is possible that the Hankamer committee and the forum eventually will join forces, but Halbouty is not waiting for that.

"I left part of my life on that rostrum," he said fervently last week. "This thing has cost me at least $32,000 and 6 months of my time. I don't want anybody saying the majors or anybody else paid for it, and I've had plenty of offers. I'm fighting City Hall. This is a dedicated thing."



Memo to management:

That inventory "drop" is deceptive

THIS is the time of year when some oil men—and some oil writers—are prone to look at the stock charts and conclude: Inventories are in great shape. They're below last year.

Don't be fooled. The only reason 1960 looks good is that stocks soared this time last year. Stocks this year are still high (see p. 193 for details).

The charts above illustrate the statistical legerdemain.

Bars on the left panel seem to indicate clean-product stocks are falling, compared with last year. Actually they're rising. The chart means that the stocks are down to last year's levels but most of the help came from the big increase about this time last year.

Clean stocks for instance increased 3,739,000 bbl. last week—somewhere near normal for the season—but for the same week a year ago the net gain was 6,450,000 bbl. This makes 1960 look good by comparison.

Much of the year-to-year variation is in gasoline. Take the week ended May 27: This year gasoline stocks dropped 2,480,000 bbl. For same week last year, reduction was only 470,000 bbl. Gasoline stocks actually increased 465,000 bbl. in first week of June last year but dropped 1,750,000 bbl. this year.

Best way to judge inventory levels is to measure reported stocks against what you think stocks should be, as well as against last year's level.

Soviet Deal Stirs Canadians

LEADERS in western Canada are taking dead aim at federal government plans to allow millions of dollars worth of Russian gasoline to flow into eastern markets.

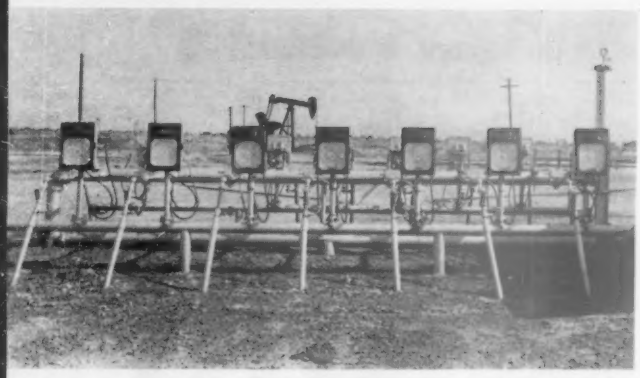
Provincial government, press, and industry leaders all have minced no words in attacking such a plan after it became known through reports in Ottawa (OGJ June 6, p. 80).

Alberta Premier E. C. Manning called the plan "shortsighted and ill-advised." He declared Russian imports would be a blow at a policy of oil self-sufficiency for the North American continent.

Ottawa sources said the Russian gasoline would replace oil brought in from Arabia or Venezuela. But Manning noted that this displaced Arabian or Venezuelan crude would find another market elsewhere in the continent with a resulting depressing effect.

The Canadian Petroleum Association also strongly protested the trade policy. CPA termed the Russian shipments part of an apparent official Soviet economic warfare policy that would further disrupt the Canadian market. But more important, the deal might ruin prospects for increased Canadian oil shipments into the United States.

The oil trade group pointed out that Canada's oil industry is now producing only at half of its potential and the nation is still importing half of its petroleum needs.



Here is some background on the problem that is becoming a king-size . . .

THE TEXAS Railroad Commission has taken a close look at proration prior to its important June 16 hearing.

Here are its findings.

Roughly 55% of Texas' 195,470 wells are exempt from shutdown days.

These 107,258 exempt wells now have 1,194,021 bbl. daily—or 46%—of the total calendar-day allowable of 2,608,003 bbl.

Under the current 8-day producing schedule, the remaining 88,212 prorated wells are allowed 1,414,882 bbl. per calendar day.

If the prorated wells were allowed to produce each day, as do the exempt wells, they would have a daily allowable of 5,483,548 bbl.

Going further, the commission found that the average calendar day allowable per well in Texas now is 13.35 bbl. The exempt wells have an average daily allowable of 11.13 bbl., while the prorated wells are averaging 16.04 bbl.

There are several classes of wells exempt from proration in Texas. They include:

. . . **Marginal wells.** These are exempt under the state's marginal-well law. This law sets floors by

Texas Headache: How to prorate floods

TEXAS this week tackles a problem of growing portent to all oil states and the entire petroleum industry.

The problem: How to regulate mushrooming secondary-recovery operations. They deserve adequate allowable incentives but not so much that production from primary wells is throttled to the point that exploration is discouraged.

The Texas Railroad Commission comes to grips with the problem June 16 in a hearing that promises to be long and hotly contested.

A sense of urgency surrounding the session is created by several factors: Some real giant fields in Texas are approaching the secondary-recovery stage. Oil flow from secondary-recovery operations already is increasing rapidly. At the same time allowables for prorated wells have gone down and down, pinched by secondary-recovery wells which have gone free of any controls.

Texas stands alone . . . Other state regulatory bodies already have exhibited concern over the same problem.

Chief concern of these groups historically has been to promote as near complete recovery as possible in the name of conservation. Thus no limits were placed on the stripper wells to encourage full recovery. This policy went well so long as there was ample demand for crude. It grew complicated, however, when oil became too plentiful.

That's why first moves toward control of secondary-recovery production were taken in:

. . . **New Mexico,** where officials decided stripper floods could be prorated without loss of ultimate recovery. The state commission proceeded to draw up rules placing allowable ceilings on future projects (OGJ, Nov. 23, 1959, p. 50).

The New Mexico action followed a commission finding that unrestricted production in water-flood projects has had an adverse impact on market available for primary oil in the state. Continued flood production would aggravate the problem. Whether the New Mexico method of restriction will be effective is still argued—but its intent is clear.

. . . **Oklahoma,** where last July the commission adopted a policy that a flood producer should get no more allowable than a primary well of comparable depth and that only the producing wells in a flood project should get allowables.

The Oklahoma commission later modified this to set maximum per-well output for a flood producer at 20 bbl. daily or whatever is permitted by the depth bracket. Since 20 bbl. daily is about equal to the output allowed by the bracket for a 6,000-ft. well, most operators have chosen to take the 20.

. . . **Kansas,** where operators now agree generally that it is tough to get more allowable for a flood well than for its primary equivalent.

The Kansas commission has granted more. But a heavy burden of proof is placed on the operator to show it is needed. Allowable transfers from wells converted to input service are not permitted.

Thus, Texas now stands largely alone among the prorating states in placing no ceiling on stripper-flood output.

Such projects are not confined to yardstick allowables in Texas if the wells have the capacity to exceed them. Furthermore, they are exempt from shutdown days which force primary fields now to produce their yardstick or MER rates only 8 days this month. And, finally, when a producing well is converted to injection service, its allowable normally is transferred to another producer.

Pressure-maintenance floods, those with one or more top-allowable wells at the start of the project, do not enjoy the same freedom. They, too, benefit from the allowable-transfer privilege. But they are subject to shut-down days. And their per-well allowables seldom top the yardstick rate.

Along with considering ceilings on

depth below which a well cannot be prorated. If the well under test proves it cannot make more than the volume set by the law for its depth (see OGJ, Jan. 25, p. 125), it is exempt.

... Discovery wells. A new-field discovery is given an incentive allowable which it may produce each day exempt from shutdown. The allowable is given to the first five wells in a field, until the sixth well is completed or until 18 months has passed—whichever is soonest.

... Stripper floods and other recovery operations started in fields in the stripper stage of production. If a field has any top-allowable wells, however, the injection project is classed as a pressure-maintenance operation and is not exempt from proration.

... Problem wells. Wells with tough operating problems are often exempt. These include those with heavy water cuts or severe sand problems. Some wells in salt-dome fields also are exempt. The problem-well class is relatively small and believed getting smaller.

... County regular wells. The county regular fields, all in North and West Central Texas, actually are large clusters of small fields. They were lumped together in 1949 and exempted due to the complexity of trying to define boundaries and administer them separately.

The commission study shows that most exempt wells are in secondary-recovery and county regular fields. The commission does not break down this category further. And these wells have nearly 60% of the state's total exempt allowable.

EXEMPT ALLOWABLE AND WELLS

Exempt classification*	No. wells	% of all wells	Av. daily, bbl.	Av. daily per well, bbl.	% Texas cal. day allow.	% total exempt allow.
Marginal	48,717	24.92	358,901	7.37	13.76	30.06
N.P.X.	1,597	0.82	122,560	76.74	4.70	10.26
S.P.X.	176	0.09	5,104	29.00	0.19	0.43
Other	56,768	29.04	707,456	12.46	27.12	59.25
Total	107,258	54.87	1,194,021	11.13	45.77	100.00

*Marginal—Wells classed as marginal under the marginal well statute.

N.P.X.—New pool on discovery allowable.

S.P.X.—All wells granted exempt allowable due to particular well problems or operating conditions.

Other—Includes exemptions granted secondary-recovery projects and county regular fields.

to provide equal treatment for all wells

stripper-flood allowables, the Texas commission also will eye this week the feasibility of treating both types of projects alike.

The effects . . . A thriving business has bloomed in secondary recovery in Texas which has a stake in outcome of the hearing.

A large number of companies have been organized to concentrate their activities on acquiring and flooding depleted pools.

Last year, the commission processed and approved a record 408 new secondary-recovery and pressure-maintenance projects. The number approved this year already is nearing half the 1959 total. And snowballing applications not yet processed make it appear that 1960 will set another new high.

At least part of this activity is attributed by some to attempts by operators to "get under the wire" with exempt allowables prior to any restrictions which might follow this week's hearing.

Some informed sources insist the growing number of floods is not the entire explanation for the commission's decision to consider restriction.

The commission is worried by the fact that some huge fields in Texas are now near primary exhaustion. The list is impressive, including such names as Slaughter, Wasson, Spraberry, Seminole, and others.

The thought of capacity floods in such whoopers as these, when primary fields are already so severely cut back, is enough to create nightmares in Austin.

Under present policy, the commission would find it awkward to deny capacity allowables in these fields, because the bulk of their leases would already meet its qualifications.

Limitations probable . . . Prospects are, many think, that the commission will restrict on stripper-flood production.

There has been heavy opposition to any such action in the past on the part of many independents and some majors. But it appears this time that few, if any, operators will appear at the hearing in outright opposition.

The argument will be over the degree of restriction.

Those who fought it now appear resigned to some control, but they will fight hard to make the restrictions painless.

These operators have united to form the Texas Conservation Group — and have hired legal and engineering help to push their case in Austin. They already have announced they will urge the commission to adopt "a relatively fixed allowable that will permit operators flexibility in production."

A more specific proposal which the group has bandied about and may propose is that floods generally be limited to yardstick rates but be given bonus allowable above these rates for over-injection. The bonus would be given on a sliding scale according to how much more fluid an operator injected than he produced. Floods would remain exempt from shutdown days.

A corollary proposal discussed by this group and aimed at the giant-field problem is this: Restrict the big project to the yardstick rate. Let the operator flood only a portion of it at a time. But let him produce the yardstick allowable for the entire project, from the portion flooded.

Tougher proration sought . . . On the other side of the fence, and seeking much tougher restriction, will be Humble Oil & Refining Co., Texas' biggest producer.

For several years, Humble has fought hard in Texas and New Mexico to cut back what it claims is an ill-founded advantage given to floods at the growing expense of primary wells and exploration.

Evidence presented by Humble witnesses at Santa Fe is credited with playing a major role in swinging the New Mexico commission to the decision to prorate floods.

In the past Humble has urged the

Gas Condensate Won't Be Considered

THE Railroad Commission's June 16 hearing will not consider restraining gas-condensate production.

Such action had been requested by the West Central Texas Oil and Gas Association.

The WCTOGA charged in a resolution sent to the commissioners that gas-liquids output in Texas has mushroomed rapidly to more than 550,000 bbl. daily and has cut deeply into the crude-oil market.

Condensate, a gas-well byproduct, is not prorated except by the volume of gas a well is permitted to produce.

The association urged a study which would result in a regulatory climate where all producers of liquid hydrocarbons "will compete on an equitable basis."

It asked alternatively that, if the issue were not included on the June 16 docket, it be set for a later hearing. Informed sources think it doubtful that the commission will do this, either.

Any hearing on proration of gas liquids would be hot and interesting.

The flow of condensate could not be cut except by reducing the flow of the gas which contains it.

Since gas already is prorated, gas producers would object strenuously to "secondary" or "double" proration.

In Texas the buyer, in most cases, actually determines the gas allowable. His need for gas from a field is distributed ratably among the field's wells. Each field stands on its own.

Cutting gas production to reduce condensate flow would resemble, in reverse, what is now done to limit gas production in some Texas oil fields with high gas-oil ratios. In these cases, oil output is limited by g.o.r. penalties so as to conserve reservoir energy.

Texas body to abolish capacity flood allowables in favor of a maximum at a field's yardstick or MER rate. It has argued also that floods should not be exempt from shutdown days, that they can be so restricted without damage to ultimate recovery.

Some other major operators are expected to take positions somewhere in between.

Atlantic Refining Co., for instance, plans to submit a plan whereby allowable would be distributed to any kind of artificial drive according to the amount of additional oil reserves created.

Under its plan, a project would get 500 bbl. of allowable per producing day for each 1,000,000 bbl. of reserves it added to ultimate recovery.

It would have an optional feature, whereby the operator could choose to take the yardstick allowable if it were greater.

Atlantic is prepared to argue that allocation based on reserves is now administratable—that the industry has had sufficient experience with it in Alberta and Arizona to make it work well.

Interest in this week's Texas hearing is running high — not only among Texas operators but among regulatory officials in other states.

Conservation agencies in other states will be watching closely to see how Texas is going to handle a problem common to them all.

The Oklahoma commission definitely will have observers at the hearing. And it is likely that others will, also.

Along with the water-flood issue, the Texas commission will hear testimony on restrictions for MER's of existing and future fields to the depth-bracket rates.

In earlier years when demand was more favorable, some fields got higher-than-yardstick MER's on showing they were able to produce more efficiently. Some still have these higher rates. The commission recently appears to have followed a policy of restricting MER's to or below the yardstick.

Canadian Rockhounds are hard up for work

MORE unemployed geologists are registered with the National Employment Service in Calgary than ever before.

The NES says more than 40 are registered. There are others unemployed, it adds, who aren't registered, and NES sees no prospect for a change soon. Normally only one or two geologists are registered with the service.

One oddity noted: This year's college graduates are finding jobs more easily than experienced geologists. NES thinks this may be due to two factors: Companies find it harder to absorb a geologist trained in the policies of another company than they do a new graduate, and, too, the new graduate's learning is up-to-date.

The unemployment situation was created by company reorganizations and a tightening of budgets. It is not improving because, in many cases, companies are not replacing geologists now leaving or retiring.

Outlook for

• They're producing too much oil, says Louisiana, in putting restrictions on their use.

LOUISIANA last week dropped a blockbuster on the future of multiple completions.

To halt the steady increase in production during a soft crude market, Conservation Commissioner Ashton Mouton issued an order knocking out allowables for oil wells completed in multiple sands in the future.

Hardest hit by the order are offshore operators, who are today completing most of their wells in more than one zone to offset the high cost of offshore drilling. Several larger operators said privately the order will curtail offshore exploration and development.

Mouton, in announcing the order, was emphatic in denying that the Supreme Court's tidelands decision was responsible. He pointed to a warning he issued a year ago that unless new production from multiples were curtailed, the state would have to act. He said the multiples were being made with "complete disregard to market conditions."

The warning went unheeded, he added, and the state was forced to either cut back the allowable for all

PIPELINE

A 200-mile line will be built by Panhandle Eastern Pipe Line Co. from Elk City field, western Oklahoma, to Panhandle's main line at the Haven, Kans., compressor station. The line will have 50 miles of 22-in. and 150 miles of 24-in.

A natural-gas liquids line is planned in South Louisiana by Sibon Pipe Line Co., Houston. The 16-mile 8-in. line will run from near Bayou Pigeon to Lake Fausse Point in Iberia Parish.

An 11.5-mile extension to the South Louisiana Delta system of Shell Pipe Line is planned this summer. The extension will consist of 4.6 miles of 8-in. and 6.9 miles 10-in. pipe to connect production at West Delta Block 83 field and Burrwood field with a

New Multiple Completions: Confused

multiple completions or eliminate multiples for the future. If conditions do not improve, he warned, currently producing multiples may suffer an allowable cut.

Mouton hoped that the new order will be temporary, however, and can be rescinded in 30 to 60 days. Market conditions will be the controlling factor.

The order . . . Operators can continue to make multiple completions, but they cannot produce from more than one sand until the order is lifted.

Operators must gamble on whether to spend the money for multiples and hope that later they can be produced.

Effective June 7, further multiple completions will get no allowables, with two exceptions:

1. In pools where there is production from two or more sands already approved, future wells may be completed multiply to these sands, and each completion would get a full allowable. No new sands may be added, however.

2. A gas well may be multiply completed to add one oil sand and receive one oil allowable.

The order does not limit gas production or completions in any way.

Offshore effect . . . Coming on the heels of the Supreme Court's decision fixing Louisiana's boundary at only 3 miles from its coastline, the order may well have some ramifications down the line on control of offshore production.

Under an unofficial agreement between the state and federal governments, drilling and production in federal waters is controlled by the state.

This condition is expected to continue, at least until the decision is finally affirmed and the 3 mile boundary line is fixed officially.

Federal officials have expressed hope that even after the tidelands issue is firmly settled, the same relationship with the state can continue. However, the Government will have to be satisfied that offshore operators are not being unduly penalized by state regulations, and it is possible that the operators will put pressure on the Government to set its own allowables for production in federal waters.

While most offshore wells are multiply completed, a sizeable number in certain areas are still singles. Where sands are thick, some companies believe it more profitable, in the long run, to drill singles and avoid risks.

One federal official said that last week that some offshore operators were satisfied with Mouton's order because it was the lesser of two evils. There was a danger—and still is, as Mouton pointed out—that all multiples will lose part of their allowables. Under the present order, companies at least have the option of deciding whether to drill new wells; under the alternative, they would suffer a loss of income after spending development money.

Lease sales . . . It is too early to say whether the order will adversely affect future lease sales, but it certainly will make companies think twice before bidding.

For example, one operator said he based his bids in the record-breaking February lease sale on 2.2 completions per producing hole. If only singles can be drilled, the platform costs assigned to wells in deeper waters will be simply too great to make the operation economic.

No new lease sales have been announced. Although state and federal officials are considering one this year for zone 2, where there is drainage of unleased tracts from nearby producing leases.

Justification . . . Mouton defended his decision to cut back multiples on the grounds that something had to be done to protect the crude market.

New production in May amounted to more than 16,000 bbl. daily. Most came from multiple completions.

Louisiana reduced its allowable for May and June from 35% to 33% of its March 1953 rate, and Mouton said he didn't want another cut.

"If we continue reducing our allowables, the rate on investment will not justify operators' coming in here and drilling," he said.

Also, he added, if the allowable were reduced, this still would not solve the problem of new production.

BRIEFS . . .

terminal at Southwest Pass. Shell also will build five pump stations and purchase 1.5 miles of 8-in. existing line from Horstal station to Southwest Pass. Work will start about July 15.

Reconditioning and replacing of a 60-mile 12-in. gas line is planned next year by Rio Grande Valley Gas Co., Brownsville, Tex. The line runs from the Moore field area to Prado field area in Hidalgo, Starr, and Jim Hogg counties, Texas.

Alberta Oil and Gas Conservation Board has reserved decision on the application of Westalta Products Pipe Line, Ltd., for permit to build a $150-million products pipeline and gathering system in Alberta. The products would be made available for movement to the Great Lakes region of the United States.

Construction will start this week on a 15-mile 8 and 10-in. line for Southern Natural Gas Co. in Marion and Walthall counties, Mississippi. Harbert Construction Corp. has the contract.

Station expansion totaling 2,900 hp. is planned this year on the Badger Pipe Line Co.'s products system. Three 700-hp. units will be installed at the East Chicago, Ind., pump station, and one 400-hp. unit will be installed at Rockford, Ill., and Des Plaines, Ill., stations.

Canadian Industrial Gas, Ltd., is the new corporate name for Ajax Petroleums, Ltd. The company plans a major extension of its main natural-gas transmission line to the Westlock area of Alberta. Construction of the new facilities can be undertaken in the summer of 1961. The company also plans extensions to its existing pipeline system.

Also for Pipeliners . . .

IN THE NEWS: Derby pipeline suddenly becomes key issue in producers' fight to halt price cut (p. 65) . . . FPC may be forced to operate for months with only three commissioners instead of five (p. 66) . . . Northern Illinois Gas is testing revolutionary underground gas storage technique (p. 71) . . . Bids asked by Esso and Oasis on two big-inch crude lines in Libya (p. 84) . . . Italian interests order engineering study of gas line from Africa to Italy (p. 87).

PLUS THIS TECHNICAL REPORT: What's happening to hot-applied coatings? (p. 104).

Kenai's Seventh Well Gets Gas

- Two other Alaskan holes are deep, with no big oil in sight. Even so, explorationists plan a busy summer.

ALASKAN wildcatters are having their troubles too.

Western Operations, Inc. has completed Standard-Richfield's 32-10 SRU as a gas well in Swanson River field on Alaska's Kenai Peninsula. This is the first gas producer for the field. Six other wells are oil producers.

The 32-10 SRU was taken to total depth of 12,029 ft. but completed at 3,950 ft. The Hemlock sand, source of all production to date, carried no oil. Potential has not been taken since producing equipment is not installed.

The gas will be used to fuel pumping stations along the crude pipeline from the field to Nikiski terminal on Cook inlet.

Two other deep wildcats in the state have reached crucial stages. Both have reached total depth and reportedly are being abandoned.

Benedum & Associates' 1 Nulato, first interior test for Alaska, has reached 12,015 ft. Abandonment has been rumored. The well lies in the Kateel-Koyukuk basin in west central part of the state.

Across the state in the southeastern section, meanwhile, Richfield Oil Corp. has abandoned its 1 Kaliakh at 14,699 ft. in the Katalla-Hakataga basin. A 7-in. casing was run to 13,421 ft. prior to testing. Company plans to spud a second well in the Kaliakh River area soon.

Busy summer . . . Despite the lack of encouragement in the three latest Alaskan wells, the new state will see a lot of activity this summer.

Unexplored regions in Alaska will attract at least 20 geological field parties this summer working for 13 oil firms.

Shell Oil Co. and Texaco Inc., particularly, plan an active summer in the new state. Shell will put four parties to work in the Kandik area and on the Arctic Slope. Texaco will have three busy on the Kenai Peninsula, the Ruby area, and the Arctic Slope.

Companies planning two geological parties include Humble in the Fort Yukon basin and Arctic Slope; Pan American in the Copper River basin, Mt. McKinley area, Fort Yukon-Kandik region, and the Brooks Range; Union Oil Co. in unannounced areas; and Western Gulf Oil Co. in the Kenai and Alaska peninsulas.

British American Petroleum Co. plans to have one party working the Tuxedni Bay, and the Copper River and Bethel basins. British Exploration Co. will have a party in the Nulato area and possibly in the Kandik area. Phillips plans work on the Alaska Peninsula.

Sinclair Oil & Gas Co. will explore the Kandik and Arctic Slope areas, and California Standard geologists will work in the Copper River basin.

A joint-venture company called SUCOHOSU, composed of Sunray, Continental, Honolulu and Superior, will have a party in the Kandik area, and Superior will have a separate party on the Alaska Peninsula.

Atlantic Finds Gas in Montoya

- 1 Kelly will be Texas' deepest if it's commercial in sands below Devonian.

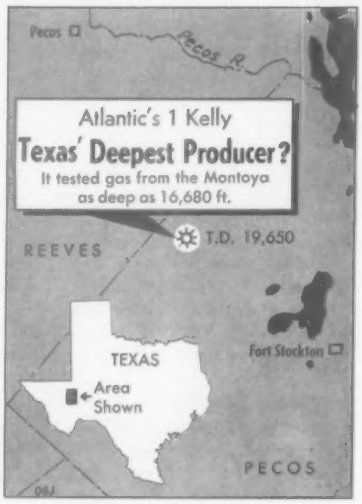
ATLANTIC REFINING Co.'s 1 J. C. Kelly rank wildcat in the Delaware basin may take over the title of Texas' deepest producing well.

The Pecos County deep test, which found big gas in the Devonian late last year at 15,873-923 ft., now has found apparent commercial gas production in the deeper Montoya.

Operator gaged gas at a rate of 4,618,000 cu. ft. daily during a 10½-hour test through perforations in that zone from 16,550-56 ft., 16,580-16,610 ft., and 16,650-80 ft. Flow was through ½-in. choke after a 1,500 gal. acid treatment.

Testing was interrupted due to a minor fishing job which occurred when the packer slipped. Considerable mud was lost to the hole. And Atlantic geologists feel that the recorded gas flow might not be representative of the zone's true potential due to mud interference.

Operator at mid-week had recovered the fish and was conditioning hole prior to resuming tests. Only pressure reading taken was prior to the initial test when shut-in pressure at the surface was 5,325 psi.



If the 1 Kelly is able to complete in the Montoya as now appears probable, it would displace Pure Oil Co.'s 1 Houston Farms Development Co. in Galveston County as the state's deepest producer.

The Pure well was completed in the Frio late last year for gas condensate at 16,264 ft.

The closely-watched Atlantic well still has not run production tests on the shallower Devonian zone which flowed gas prolifically during drill-stem tests late last year.

The Devonian flow, through ½-in. top and ⅝-in. bottom-hole chokes, was estimated by Atlantic at 15,000,000 cu. ft. daily.

The 1 Kelly, 30 miles west of Fort Stockton, in Section 8, Block 51, T&P Survey, also is the deepest well ever drilled by Atlantic. It went to 19,650 ft. in the Ellenburger. Operator tested this formation and found it dry prior to plugging back to the Montoya.

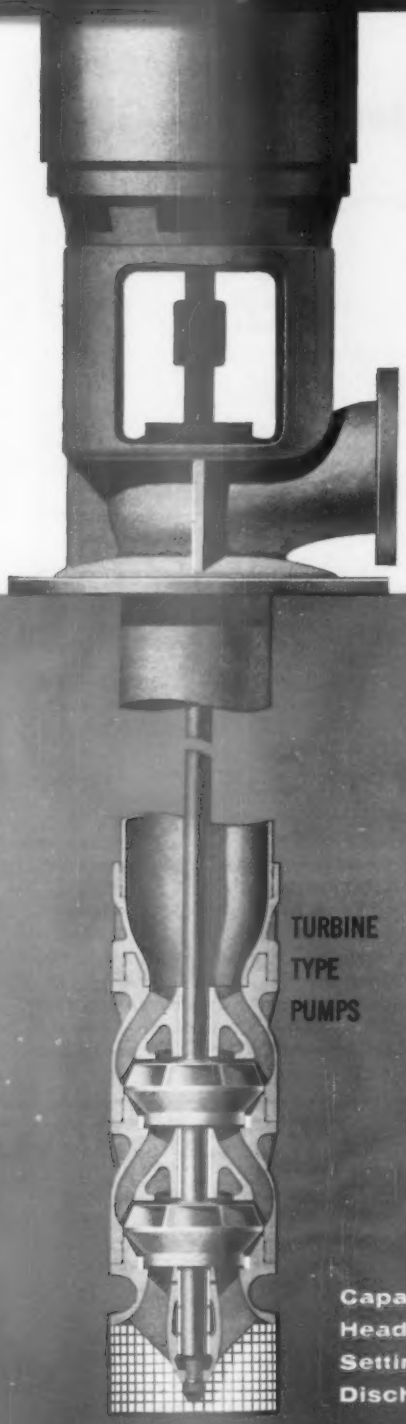
Fresh-Water Flood Approved

THE USE of fresh water in New Mexico water floods has been approved by State Engineer Steve Reynolds.

The ruling was made after surface users of water in Lea and Eddy counties protested the granting of underground water permits for secondary-recovery projects to Adair Gossett of Carlsbad (OGJ, March 14, p. 104).

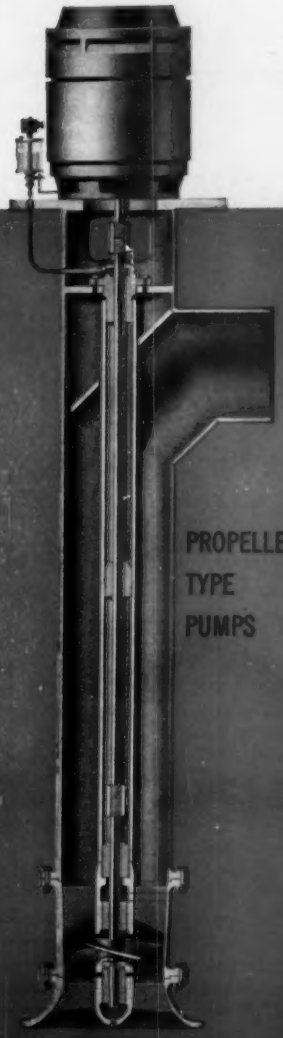
However, the State Engineer cut Gosset's permits from 10,000 acre feet to 282 acre feet, the amount which Gossett actually had committed. Under existing state law, Reynolds held, Gossett could not obtain the water first and then seek customers for it.

Layne SHORT COUPLED SERVICE PUMPS for any job



TURBINE TYPE PUMPS

MIXED FLOW PUMPS



PROPELLER TYPE PUMPS

Capacities — 50 to 100,000 GPM
Heads — Up to 2,500 Ft.
Settings — As Specified
Discharge - Surface or underground

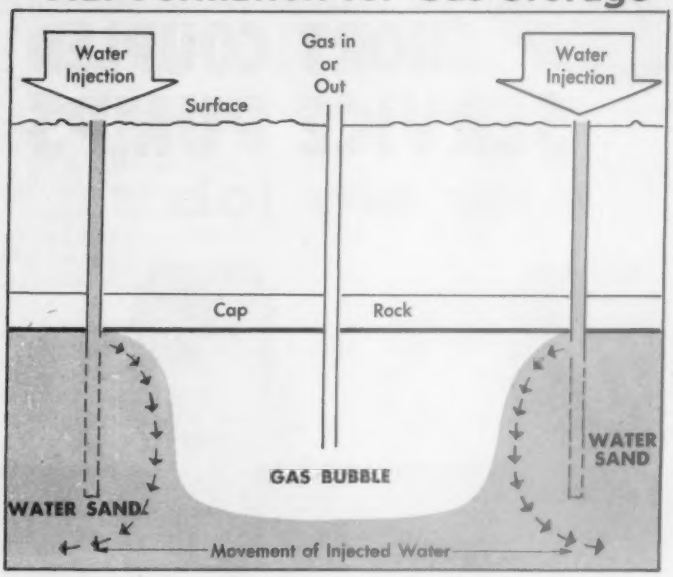
Top performance, high efficiency and less maintenance are factors which influence the selection of a short coupled pump. Layne Vertical Service Pumps fulfill these requirements and offer the advantages of lower installation and operation costs, low submergence requirements, simple alignment, no priming and less floor space demands. For any short coupled pumping job . . . specify Layne.

Write For Free Bulletins:
LAYNE TURBINE TYPE SERVICE PUMPS—NO. 300
LAYNE PROPELLER AND MIXED FLOW PUMPS—NO. 350

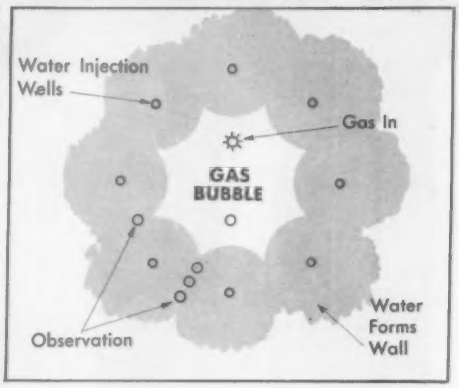
World's Largest Layne Water Developers

LAYNE & BOWLER, INC., MEMPHIS
General Offices and Factory, Memphis 8, Tenn.
LAYNE ASSOCIATE COMPANIES THROUGHOUT THE WORLD
SALES REPRESENTATIVES IN MAJOR CITIES

Flat Formation for Gas Storage



Water Confines Gas



NEW gas-storage theory being tested by Northern Illinois Gas Co. is explained in diagrams. Water-injection wells are drilled in a circle (above) around a gas-input well. Water forms a wall around the gas and holds it in bubble form against the flat cap rock (left).

Will a Wall of Water Hold Stored Gas?

• Northern Illinois, with few handy domes for storage, is trying a new idea: Inject gas under the flat Cap rock, surround the "bubble" with water to prevent its escape.

AN EXPERIMENT in a revolutionary type of underground gas storage is being conducted at one of its stations by Northern Illinois Gas Co.

Its outcome could prove important to the entire gas-transmission and distribution industry.

Northern Illinois engineers actually are testing a theory that a wall of water can ride herd on a mass of gas, keeping it collected in the form of a huge bubble against the cap rock of an underground formation.

The problem is this: There is a scarcity of good underground-storage reservoirs. This ideal storage spot is a formation where a sandstone cap rock is in the shape of an inverted saucer. Gas forced into the dome under pressure is caught and held.

Instead of domes, reservoirs in Northern Illinois Gas' distribution area too often have a cap rock that is flat or one that it open on one side. Gas injected into these structures would escape below the cap rock.

Northern Illinois Gas engineers believe that water injected either on the open side of the rock formation or on the periphery of the reservoir will form a wall keeping the stored gas in bubble state against the cap rock.

The experiment is being carried out at the company's Station 147-Matteson. Eight water-injection wells have been drilled in a circle about 1,700 ft. in diameter. Five observation wells and one gas-injection well also are being drilled.

When the experiment actually starts, water will be injected into the wells around the circle. Air will be pumped into the structure instead of gas. Trouble with an air compressor has delayed start of the test so that results now probably won't be known until late summer or fall.

If the water pressure actually keeps the air confined to the area of the injection well, it will open up the possibility of using flat storage reservoirs for gas. The tests also are designed to give answers to other such questions as the proper water-injection rate, volumes needed, and the relative costs of the new method.

Underground storage near consuming centers has become a pressing need for Northern Illinois Gas. The utility receives 514 million cubic feet daily from its suppliers. The company requires much more than that volume to meet needs of its customers on cold winter days but less than that during the warm months.

Stored gas is used to meet the peak needs. Several new storage reservoirs in northern Illinois will be needed within the next 5 years. These can be found easily if the current experiment proves successful.

Northern Illinois Gas engineers believe the pressure of the injected water will keep air confined to the area of the injection well. If the experiments prove them correct, they will be able to use "flat" storage reservoirs or caverns where the cap rock is open at one end.

PROCESSING

Shell Oil Co. will build a 75 to 80 million cubic feet per day gas-processing plant at the mouth of the Mississippi River to process casinghead gas from its Southwest Pass area oil fields. Liquid recovery is estimated to be 725 bbl. per day of natural gasoline and 400 bbl. per day of propane.

Union Carbide Corp. will build a polyethylene plant near Ponce, Puerto Rico, to utilize ethylene from Commonwealth Oil Refining Co. also at Ponce. Capacity of the plant will be 110 million pounds per year with construction to be completed in the second half of 1962 at an estimated cost of $20 million. The facilities will be operated by Union Carbide's subsidiary, Union Carbide Caribe, Inc.

Sale of Polymer Corp., the government-owned Canadian synthetic-rubber producer, is being rumored in Ot-

Los Angeles Refiners Face New Controls

• Olefins in gasoline must be held to 18% under rule which goes into effect July 1. Most refiners can meet requirements, but they question rule's usefulness.

REFINERS SERVING the Los Angeles market take note: Check the olefins in your gasoline.

If they're too high, you're headed for trouble with the los Angeles county government.

Controversial Rule 63 goes into effect July 1. The rule makes it a misdemeanor to sell gasoline in the county with a bromine number above 30. A bromine number of 30 is equal to 18% olefin content.

The Air Pollution Control District, Los Angeles County's watchdog on smog matters, reports most companies are marketing gasoline under the 30 level. APCD says a "few minor companies may have difficulty meeting the deadline."

The companies aren't happy about the county giving them a formula for their gasoline. They maintain there is no assurance a low olefin content in gasoline will help Los Angeles smog problem.

The county is working on the theory that there is a direct relationship between the olefin content of gasoline and the olefins in auto exhaust. But the oil companies says this isn't altogether true. The companies maintain that taking the olefins out of gasoline will not take the olefins out of auto exhaust.

Tests conducted by the Bureau of Mines show thermally and cat-cracked gasoline with a high olefin content produces auto exhaust with a high olefin content. But the oil companies say this doesn't mean olefins should be restricted along the lines recommended by APCD.

Other Bureau of Mines tests show that butane, which has no olefinic content, also gives off a high olefinic auto exhaust. So the companies argue that gasoline composition is not the answer to smog.

The companies agree olefins in auto exhaust causes smog—but they say afterburners on autos are the answer to the smog problem, not the control of gasoline composition.

The future . . . Things are going to get worse before they get better.

There is little doubt that refiners and marketers will meet the new demands of APCD. But a year from now may be a different story.

Rule 63 carries a provision that the maximum bromine number on July 1, 1961, will be 20 or an olefinic content of 12%. Some refiners who aren't hurt now will feel the pinch next year.

One small refiner said he had to juggle his stocks this year to make sure no gasoline with a bromine of more than 30 gets into his Los Angeles outlets. His company is adding some downstream processing which will bring them down to requirements for the next drop. But it will cost the companies millions to get into this position.

A joint study may give refiners some relief from the strict APCD rules. The study is being sponsored by APCD, Western Oil and Gas Association, the Bureau of Mines, and the Public Health Association.

The group's first report in January said no conclusion had been reached. A second report is due out in July, but it may not carry any definite recommendations. However, something may result before the bromine count of 20 goes into effect next year.

For the present, all refiners and service stations in Los Angeles County are lining up gasolines with a bromine count of 30 or under. If an APCD investigation turns up a high number after July 1, the operator faces the possibility of a 6-month jail term and $500 fine for each day of the violation.

BRIEFS . . .

tawa, where officials do not deny the reports. The Sarnia plant, built in wartime for $48 million, last year returned $4-million profits to the Canadian treasury. The plant, however, exports 70% of its output. The government feels that new trading blocs in Europe are threatening this export market and now is a good time to put the plant on the market.

Start-up operations have begun at the Maljamar gas products plant in Eddy County, N. M., owned jointly by Sinclair Oil Co. and Skelly Oil Co. Skelly will operate the plant, which will have initial liquid production of 60,000 gal. daily.

The closing of the Tulsa office of the Treco Division of Vitro Engineering Co. is to be completed by the end of the year. Operations of the division will be transferred to the New York office of Vitro.

A new company is being formed in Australia by Monsanto Chemicals (Australia) and Consolidated Zinc Pty. Initially the new company plans to construct a manufacturing unit near Sydney for the production of fluorocarbons.

Tetramethyl gasolines will be sold in Venezuela by Mobil International Oil Co. starting in mid-June. Mobil is the first company to announce overseas sales plans for motor fuels containing tetramethyl lead.

A gasoline plant to handle gas production in Red Wash field, Uintah County, Utah, will be built by Standard Oil Co. of California. The plant will extract about 500 bbl. of liquids daily. Residue gas will move into El Paso Natural Gas Co.'s system at the Red Wash compressor station.

Long-range plans for a Nova Scotia refinery were revealed by British American Oil Co. in announcing their new marine terminal near Point Tupper on the Strait of Canso. Construction begins this year, with first deliveries due to begin next spring. The refinery proper may follow in the late 1960's.

Also for Refiners . . .

IN THE NEWS: Outlook for lubes is mixed—demand remains firm but is still lagging its potential (p. 63) . . . Derby plans to appeal Kansas Corporation Commission order shutting in wells that supply its refinery (p. 65) . . . Cost is still the big question for TML, auto engineers are told (p. 80) . . . Cuba backs away from forcing major refiners to use Russian oil (p. 82).

PLUS THESE TECHNICAL REPORTS: Fluid coker runs a record 578 days (p. 93) . . . Vacuum cleaner removes old catalyst (p. 103) . . . Isopolyesters can cut maintenance costs (p. 138).

New Commercial Scouting Service Started

A NEWLY FORMED commercial scouting service has started servicing 16 oil and gas company clients with reports on West Texas and eastern New Mexico operations.

The companies have contracted to pay $275,000 for 12 months' scouting work by the Williams & Lee Scouting Service, Inc.

The new service is basing 12 scouts in Midland, Lubbock, San Angelo, Tex., and Roswell, N. M. These four offices are connected by a TWX communications system. Wildcat, completion and other reports are being printed and distributed from the Midland headquarters.

Some companies report they will continue representation, during a transition period, in the Midland and Roswell scout checks. The Midland check is among the industry's most active scout organizations. Other companies are considering dropping out immediately.

What changes will be made in the Texas West scout check are not yet known. There are 100 active members of this check, and 38 of them represent companies buying the new service. In the New Mexico East check 14 of its 40 scouts are with companies contracting for that service.

Operators of the new commercial service are Lynn K. Lee, and C. B. Williams, Fort Worth, and E. W. Adams, Midland. Adams will serve as manager. This is the second commercial service to begin operation. The Well Record Service of Denver began work in eight Rocky Mountain states last October (OGJ, Aug. 3, 1959, p. 44).

Basic charges for the service, Lee said, are $950 monthly for the Midland area data and $500 monthly for the Roswell information. Since a maximum of 15 subscribers was required to get the Roswell program under way, and 16 signed for it, the fee has been cut at the outset to $484 monthly.

"In both Texas and New Mexico," Lee said, "as new subscribers sign for the service, the monthly fee will be reduced proportionately." Because of the scope of Midland area coverage, 16 subscribers was considered a required minimum there. Lee said.

Lee said companies participating in the new Midland and Roswell services, under one-year initial contracts, are:

Pure, Gulf, Pan American, Continental, Shell, Texaco, Atlantic Refining, Monsanto Chemical, Ohio, Sohio, Cities Service, Sunray Mid-Continent, Texas Pacific Coal & Oil, Tennessee Oil & Gas, U. S. Smelting, and Ralph Lowe.

Typed scout tickets showing progress in wildcat and development wells are prepared each week, Lee said. These tickets also record accumulated data for previous weeks. They are delivered in loose leaf binders, arranged alphabetically as to operators in counties in Texas and townships in New Mexico.

Lee formerly was division exploration manager for Pure. Williams served as West Texas division manager for Texaco, and Adams formerly was chief scout for Gulf in the area.

U. S. Loan Goes to YPFB

- **Point Four makes a policy exception in giving credits to the oil company owned by the Bolivian government.**

THE UNITED STATES is making an exception to its policy of not lending money to state-owned oil companies of foreign governments by clearing a $2.7 million grant to Yacimientos Petroliferos Fiscales Bolivianos (YPFB).

The loan under the Point Four program will be used by the Bolivian state company to purchase equipment. It is the same type of industrial credit with which Bolivia has purchased textile and tanning plants, sugar mills, and other facilities over the past 2 years.

The credit will help out YPFB at a time when the company is faced with a cutback in spending because of a lack of capital surplus in its operations. It will be used in the U. S. exclusively, and will enable the company to meet payments on $5 million in debts already owed U. S. suppliers.

The Point Four program also will underwrite a $25,000 study of YPFB's operations, organization, and future prospects on the basis of its existing oil reserves. The survey will be made by DeGolyer and MacNaughton, which has made studies in other South American countries, including Argentina.

The U. S. has avoided financial support of any state-owned oil companies. But there are extenuating circumstances in Bolivia, where the U. S. has already spent $20 million in the past 5 years in an effort to shore up its ailing economy.

Unlike state companies in Brazil or Mexico, YPFB is not a monopoly favored to the exclusion of private oil companies.

YPFB also has a reputation as a well-managed operation.

Last but not least Russia is flirting seriously with the Bolivian company. It has officially offered $70 million credit for the purchase of oil-field and refinery equipment, and a technical group has been invited to visit Russia.

West Texas Injection Project Asked

CITIES SERVICE Production Co. plans to set in motion soon a pressure-maintenance program which will hike oil recovery from Dora Roberts Devonian field in West Texas by roughly 12,500,000 bbl.

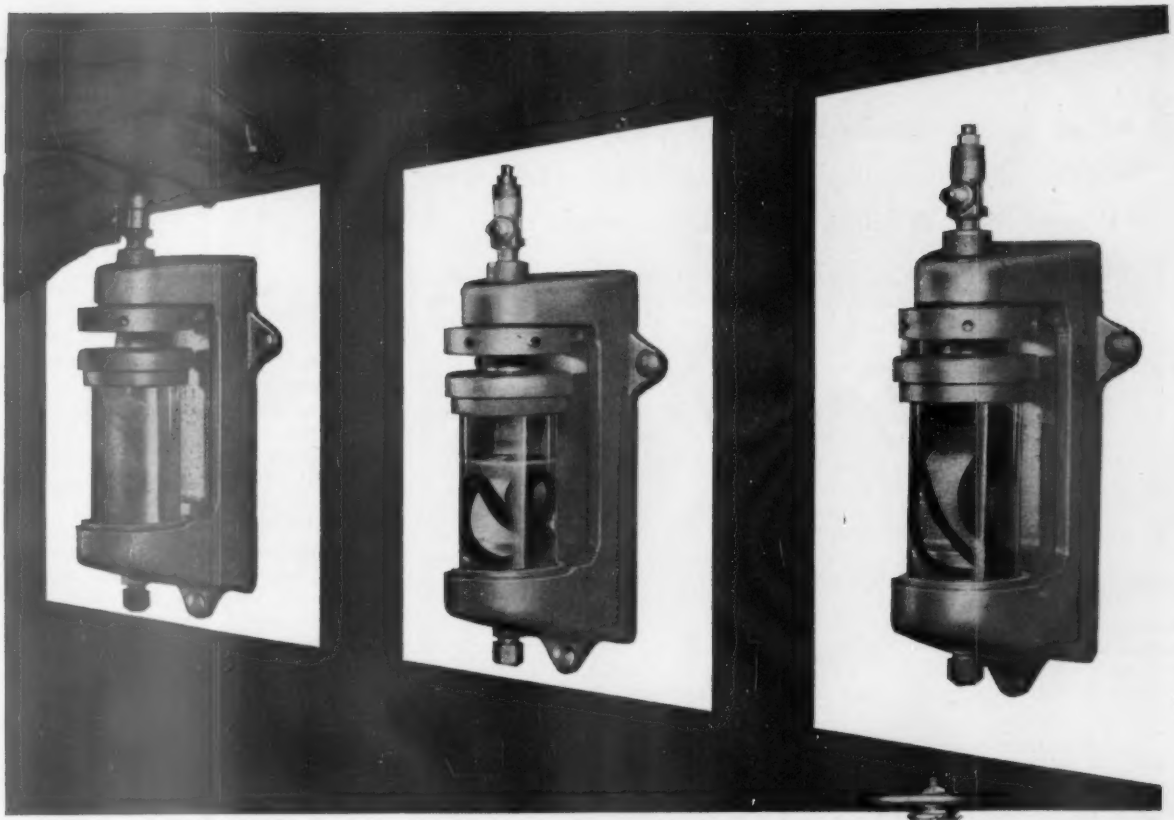
The company asked a permit from the Texas Railroad Commission to inject about 3,000,000 to 4,000,000 cu. ft. of gas daily into the gas cap of the 9,200-acre reservoir in Ector and Midland counties.

By maintaining pressure above the 4,440 psi. bubble point, Cities Service estimates it can improve ultimate recovery from about 15.6% of original in-place oil (estimated total primary) to about 45%.

In barrels, this would mean a boost from 6,461,828 from primary operations to 18,928,350 by pressure maintenance. Cities Service estimates total oil in place in the Devonian originally at 42,063,000 bbl.

As of March 1, the reservoir had produced about 1,000,000 bbl. of oil and roughly 4 billion cubic feet of gas.

Levelland flood sought . . . Meanwhile, to the north in sprawling Levelland field of Cochran and Hockley counties, Stanton Oil Co. has revealed plans to flood the San Andres under its 2,310-acre Joe L. Stanton Trustee lease.



Kerotest Valve Parts Get the ALL CLEAR FROM BOMBS

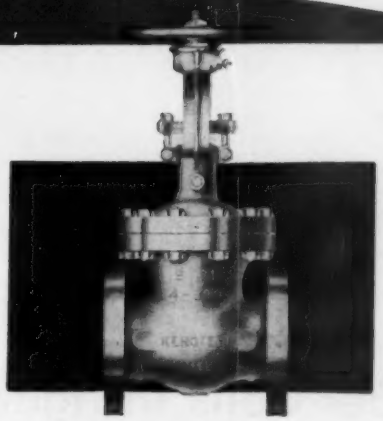
All materials and parts that go into Kerotest Valves must first get the all clear in these pressurized material test bombs at the Kerotest laboratories. Packings, plastics, gaskets, O-rings, seat rings, steel, and other materials are accepted as suitable only after they've withstood the deteriorating effects of various gases, vapors, liquids and refrigerants for specified test periods.

Kerotest quality controls are applied from the initial development and engineering phase to the final assembled valve. For those who specify and use Kerotest Valves these high standards of material and production quality mean greater valve value per dollar. With Kerotest there's minimum risk of valve failure in service and improved operating efficiency with less maintenance.

Kerotest Cast Steel Gate Valves

High quality Kerotest cast steel gate valves are available in primary service pressure ratings ranging from Series 150 to Series 1500. They are supplied in various combinations of body and trim material for all types of service in oil, gas, steam, water, chemical, petro-chemical, marine and industrial installations.

Send for your free copy of the new, informative Kerotest booklet. It's packed with working tables, dimensions, specifications and other helpful information.



KEROTEST
Quality Controlled Features

- Reinforced wall sections guard against unusual strains — erosion and corrosion.
- Built for repacking under pressure in the full open position.
- Deep stuffing box for greater packing life and tighter seal.
- Threaded, bottom seating type seat rings. Made without protruding lugs to permit full clear way opening through valves.
- All yokes made to withstand rough handling and equipped with lubrication fitting to stem nut.

There is a Kerotest Cast Steel Valve available for every class and condition of service.

KEROTEST MANUFACTURING COMPANY

2582 LIBERTY AVENUE • PITTSBURGH 22, PA.

In Canada . . . Kerotest Cast Steel Valves are manufactured and distributed exclusively by Guelph Engineering Company, Guelph, Ontario, Canada

KEROTEST®

Some Answers on TML Are Given at

• Test reports disclose some good features of the new additive. But the economics of TML will not be known for some time. Its future role is still uncertain.

TETRAMETHYL LEAD'S recent spectacular debut as an antiknock agent earned it star billing at the Society of Automotive Engineers' summer meeting last week in Chicago.

There were four papers on TML. But, despite the mass of information they added, there is still some question as to what role it will ultimately fill as a gasoline additive.

One of the papers was presented by a user—Socony Mobil Oil Co. The company is using TML on a limited scale and is enthusiastic about its possibilities. A potential user, Esso, sees some good features to TML but extols its virtues with reservations. Papers by the two manufacturers, Ethyl and Du Pont, showed they see it pretty much as Esso does.

The subject nobody discussed was the economics of TML. There is one good reason for the omission: TML is yet to be produced on a commercial scale.

Present manufacturers are limited to pilot-plant-scale production. Ethyl is turning much of its production over to Standard Oil Co. of California and Du Pont is doing the same with Socony. SOCAL and Socony are the only companies using TML on more than an experimental basis.

It will be late this year before TML will be produced commercially. Until some time after that, it will be difficult to get an accurate cost picture. Right now it is priced a good 50% above TEL.

Socony . . . Authors of the Socony paper, R. H. Perry, Jr., C. J. DiPerna, and D. F. Heath, supplied figures to show TML's superiority in road octanes.

They reported on tests of nine fuels ranging from a reformate with 61% aromatics to a motor alkylate with 2% aromatics. Their road octanes were determined on both manual and automatic transmission cars. In almost every instance TML had the better road octane, especially with the manual transmission.

The reformate, for example, showed a 5.8 better road octane with TML than with TEL and the alkylate, 3.8 better road octane with manual transmission on cars. Comparable figures for automatic transmission cars were 3.8 and 0.9.

The Socony paper concluded with this prediction: "Considering present trends toward usage of very significant percentages of high-quality catalytic reformate to meet engine requirements, it is evident that TML represents a very important addition to available methods for producing high road octane number gasoline.

"We predict that within 5 years it will be widely used by refiners throughout the free world to provide their customers with gasoline designed to satisfy widely differing antiknock requirements of their cars."

Esso . . . Two Esso Research men, T. M. Korn of Linden, N. J., and G. Moss of Abingdon, England, also gave some conclusive data on the road octane superiority of TML.

They reported on tests of fuels having almost identical research and motor ratings in 13 U. S. 1960-model cars. TML showed a road octane advantage as high as 4.7 numbers. The average for the 13 cars was 1.6.

An important factor other than road octanes, they said, is car satisfaction in terms of sensitivity and Delta R characteristics of commercial gasolines, especially in conjunction with the economics of TML addition versus refinery processing. Such subtleties as differences in fuel composition from one refinery to another is also an important factor.

The Esso researchers concluded that "it would appear that each case presents a unique problem" in deciding whether there are practical benefits in the use of TML.

Du Pont . . . D. L. Pastell and W. E. Morris said TML, because of "its unique advantages in some cars and some gasolines" will be important.

They say it will give refineries "added flexibility" in supplying gaso-

Fuel Cells Intrigue Army

• It is actively researching the devices with the hope that the military's dependence on oil can be reduced.

MORE THAN a score of fuel cell research programs are being carried on by the U. S. Army, which hopes to reduce eventually its dependence on liquid hydrocarbons.

The big reason for these studies is that transportation of petroleum products comprises "one of the most serious problems which plague the military today." However, this is only one of many factors that "have prompted increased interest in the search for new and improved energy sources and conversion devices."

E. J. Magram and R. B. Stein of the Army's Research Office reported on the advantages which the Army hopes to gain from fuel cells at last week's SAE meeting in Chicago.

The fuel cell, they said, is one of the few devices which promise greater efficiency than conventional power units. Three of the Army's technical services are now investigating fuel cell possibilities: Signal Corps, Corps of Engineers and Ordnance Corps. Each has its own objective.

Ordnance is seeking fuel cells for vehicular propulsion. It hopes to develop a system that will use petroleum-derived fuels at greater efficiency than present engines, start quickly, operate at temperatures throughout the military range (−65° F. to 125° F.), have an operating life of several months with little maintenance, and be capable of intermittent operation.

The engineers are concerned with stationary power units. The Signal Corps wants small units.

These are some advantages Magram and Stein see for the fuel cell:

. . . Logistics. Two-thirds of all cargo transported during the Korean conflict was liquid hydrocarbons. Since the problems of fuel supply in any future emergency will be overwhelming, more efficient utilization of fuel than is now possible is urgently needed.

. . . Detection. Absence of the usual products of chemical combustion of hydrocarbons will be most welcome.

SAE Meeting

lines for the changing and varied appetites of current and future cars.

They appear to see a better distant future than immediate present for TML. It will show great advantages in future premium gasolines if the expected trend toward increased use of aromatics develops.

H. E. Hesselberg and J. R. Howard of Ethyl reported the results of extensive tests. Included in the tests were 20 finished gasolines especially blended from refinery components to represent a wide range of antiknock levels and fuel compositions and 56 commercially available gasolines.

On the basis of these tests, these are the areas in which Ethyl Corp. finds that TML has it over TEL: Where there is high aromatic content, high leaded octane numbers and lead content; and where sulfur content and TEL susceptibility are low.

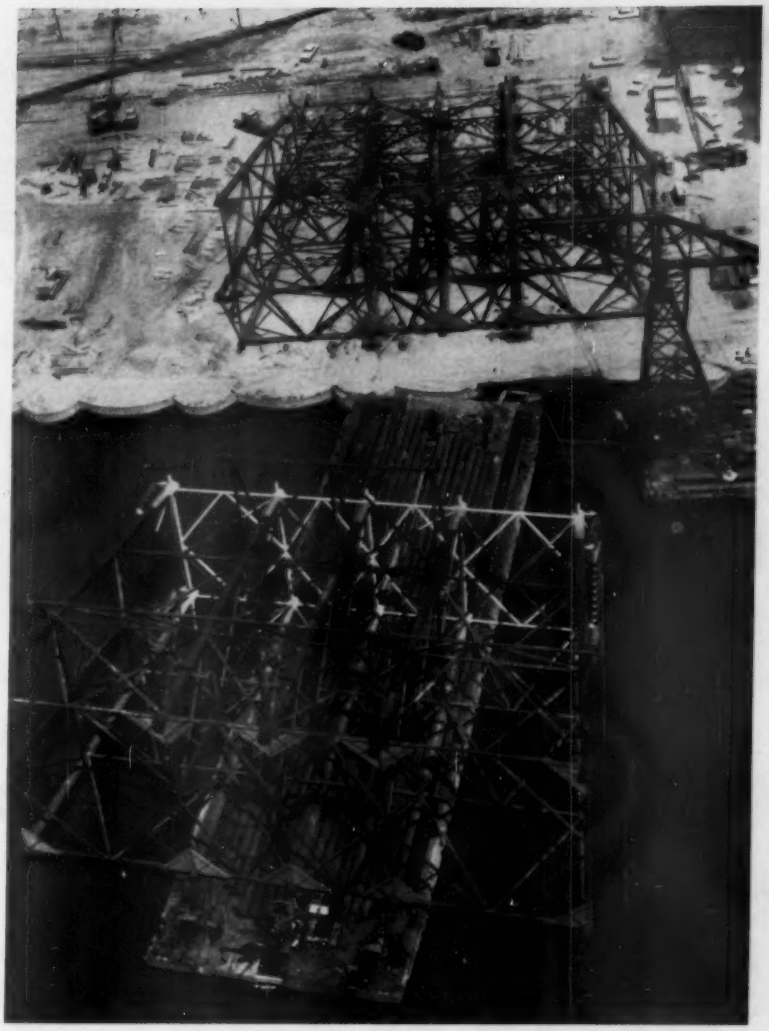
TML insures a better distribution of antiknock values of a fuel, the speakers agreed, but this is not a major problem in U. S. cars.

It is better in manual transmission than automatic transmission cars, but most cars are automatic.

It is better in high-compression cars but the upward trend here seems to be stalled.

It is better with highly aromatic gasolines but the average premium in the U. S. is under 30% aromatics and the trend toward greater use of aromatics is moving slowly.

Thus, while more pages have been added to the book of knowledge on TML, the last chapter has yet to be written.



INSTALLATION work begins this week on latest California offshore platform . . .

Elimination of noise, excessive heat generation and any other characteristic capable of detection promises to make the fuel cell a unique power generator.

. . . **Maintenance.** Reduction or elimination of moving parts would make possible a minimum of care. Fuel cells should score high on the ability to withstand vibration, shock and climatic extremes.

. . . **Compactness.** High power-to-weight and power-to-volume ratios are necessary for units requiring transportation. Advances along these lines are encouraging. The cells can use different chemical substances as well as various energy sources for fuels.

The 20-odd tasks comprising the Army fuel cell research and development program are being carried out in Army laboratories and by contract in universities and industry.

Another Month and It Will Be Ready to Drill a Costly Tract

THE COSTLY California offshore lease of Texaco, Monterey, and Newmont Oil group is the destination of this permanent offshore platform.

Workmen will be busy this week moving the parts of the giant platform to its site 1½ miles off the coast of Santa Barbara County. It will be drilling in 94 ft. of water on Parcel D, a 3,840-acre tract acquired by the three-company group in June 1958 for $23,711,538.

The multimillion-dollar platform will be equipped to drill 28 wells. The lower portion of the platform, shown here as it was being prepared to leave the Long Beach shipyards, is being installed this week. Once it is in place, the drilling deck will be lifted into position.

The drilling deck was fabricated in Houston and towed through the Panama Canal to Long Beach.

Another permanent platform is going up about 35 miles to the east along the California coast at Standard Oil Co. of California and Humble Oil & Refining Co.'s Summerland lease. This will be the second platform off Summerland, where the two companies are developing one of California's top offshore fields.

Cuba Won't Press Soviet Crude on Refiners

• Officials quietly back off request that Americans process Russian crude obtained in a barter agreement. But, they say, failure to refine it will hasten construction of a government-owned refinery.

THREE REFINING companies have won, at least temporarily, an uneasy holding action against the revolutionary Cuban government.

The three turned thumbs down on Fidel Castro's "request" that they run Russian crude and got away with it.

In fact the Cuban reaction was surprisingly mild. Alfonso Gutierrez, head of the Cuban Oil Institute, shrugged the whole thing off as "not of too much importance."

Gutierrez did concede that he had talked the whole matter over with Ernest "Che" Guevara the Argentine revolutionary comrade of Castro who now heads Cuba's national bank and is generally credited with most seizures of American property in Cuba.

The three companies, Esso, Texaco, and Royal Dutch-Shell aren't talking about the move at all. The three simply notified Gutierrez by letter that they would be unable to accept the government's "offer" of 900,000 tons (about 6,300,000 bbl.) of Russian crude this year.

The companies pointed out that Venezuela has been the traditional source of crude for all three refineries and they couldn't turn their backs on this source.

The companies would not even discuss the move last week but it was a tense day or so for everyone concerned as they waited for the Cuban reaction. It was in marked contrast to Castro's latest blast against the U. S. when it finally did come.

Gutierrez admitted that the private company refusal to process the Russian crude poses a problem for Cuba. He speculated that the trade agreement under which Russia is trading crude for Cuban sugar might have to be changed to allow importing of Soviet products instead. Or, he said, Cuba may make a deal to have the Russian crude processed in Mexico or Brazil.

The head of the Cuban Oil Institute said the original plan to spread the Russian oil among the three refiners was merely a way to reduce a $50 million debt in foreign exchange the government now owes all three refiners (OGJ, May 30, p. 71).

Gutierrez said last week the move by the three companies will speed up Cuban government plans to build a 30,000-bbl. daily refinery at Casilda on the island's south coast.

The Cuban government is now operating three small refineries on the island. The biggest has a 2,500 bbl. daily capacity. The total throughput for the three is only 3,400 bbl. daily. All of these "teakettles" were seized by the Castro regime.

The daily consumption of crude in Cuba lies somewhere between 60,000 and 65,000 bbl. daily. The combined capacity of the Esso, Texaco, and Royal-Dutch-Shell refineries is about 84,000 bbl. daily.

Reportedly, the government had wanted each of the three private plants to process 10,000 bbl. daily of the imported Russian crude, or about half of the daily consumption.

Russia claims big oil in Siberia

RUSSIA is hailing a discovery in the lowlands of western Siberia as one of the most significant exploration successes in years.

Soviet officials are hopeful that the find in Tyumen Province will give Siberia its first production and open an oil region east of the Ural Mountains that will compare with Bashkiria, one of the major areas of "Second Baku."

The discovery 5 miles west of the lumbering village of Mulymya flowed at rates up to 220 bbl. daily on tests from about 4,700 ft. The wildcat flowed 38°-gravity crude said to be similar to the light Ishimbai crude produced in Bashkiria. Sulfur content of 0.4%, however, is far lower than for Ishimbai and most other "Second Baku" crude.

The well is on the banks of Konda River in the lowlands between the Ural Mountains and Ob River. It is about 300 miles northeast of the nearest important "Second Baku" production, around Perm, and about the same distance from Sverdlovsk, an industrial center in the Urals.

Russia has considered Tyumen Province a highly promising area for almost 30 years. Gas was discovered in 1952 at Berezovo, about

275 miles north of Mulymya. Reserves in the area are now estimated at over 1.76 trillion cubic feet. A proposed gas pipeline from Berezovo to Sverdlovsk will pass close by the Mulymya find.

Last year oil shows were found in wells at Berezovo and at Malyi Atlym, on the Ob River. Wildcatting in the Shaim vicinity southwest of Mulymya is to begin this year.

NEW... SLUSH PUMP PISTON

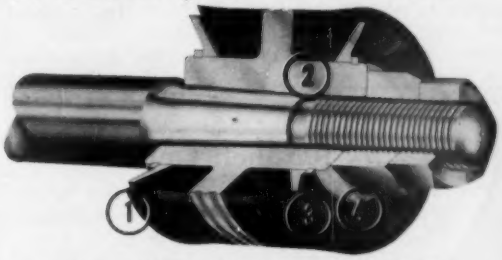
by AMERICAN IRON

Engineered for longer life . . . better performance!

Here is the NEW American Iron Slush Pump Piston that is designed to give more performance for the money and more hours of trouble-free service.

This quality piston was developed through research, engineering, experimentation and exhaustive field testing. Every component is precision manufactured from the highest quality material available.

Let the trouble-free service of the NEW American Iron Slush Pump Pistons reduce down time on your rig.



CHECK THESE EXCLUSIVE ADVANTAGES:

1. Synthetic rubber compound, highly resistant to heat, oil and abrasives. Natural rubber also available.
2. Rubber compound is moulded in the I.D. of reinforcing section to stop entry of drilling fluids into fabric.
3. Flexible end plate lengthens life of piston rubber.
4. Design of end plate, snap ring and groove in body assures proper positioning of end plate, plus easy assembly at rig.

AMERICAN IRON

Another AMF Product
PETROLEUM EQUIPMENT

AMERICAN IRON & MACHINE WORKS COMPANY, INC.
518 North Indiana Avenue • Oklahoma City, Oklahoma
Subsidiary of AMERICAN MACHINE & FOUNDRY COMPANY

AMERICAN IRON & MACHINE WORKS CO., INC. • OKLAHOMA CITY •

Bids Asked on Two Libyan Pipelines

• Esso and Oasis push two plans to move new oil to Mediterranean terminals.

WORK SHOULD be getting under way on two major crude pipelines in Libya within the next few months.

Both Esso Standard (Libya) and Oasis Oil Co. of Libya are inviting pipeline contractors to submit bids on big inch lines to move newly discovered Libyan oil north to Mediterranean terminals.

The Esso line, from Zelten field to a terminal site at Marsa el Brega, will be 30-in. The Oasis line, from Dahra field to a separate terminal yet to be selected, will be at least 30-in. with some sections possibly as large as 42-in.

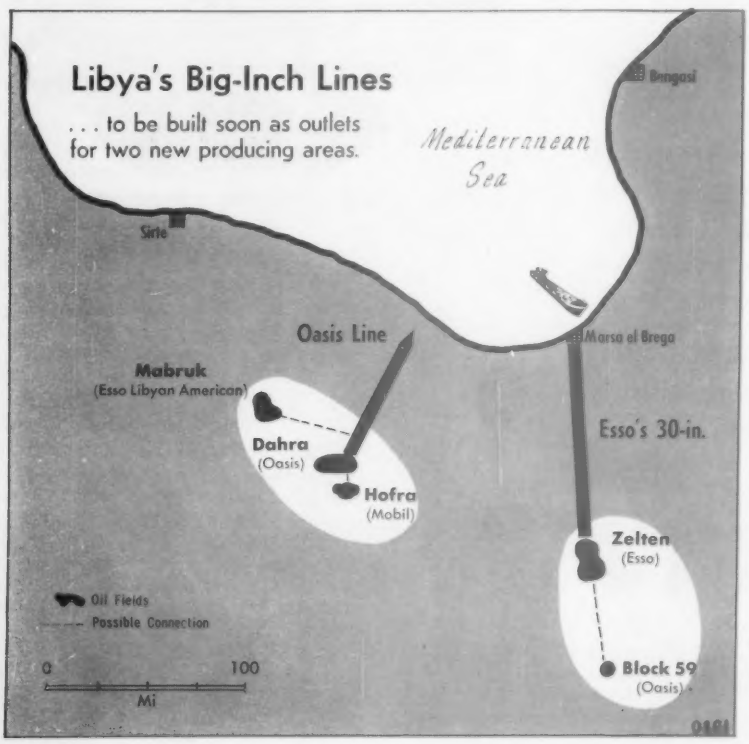
Esso and Oasis (Continental, Ohio, Amerada) are taking the lead in the pipeline planning and construction, but it is unlikely that either company will own either line outright. Other companies have established commercial fields near the primary crude-producing areas of both. It is almost certain that a number of companies will participate in the pipeline ownership.

At least five major American pipeline-construction companies are licensed to do business in Libya and there's little doubt that Emile Bustani's big Beirut-based construction firm will also be contending for one or both of the contracts. The American firms already licensed in Tripoli are Williams Brothers, Houston Contracting Co., Bechtel, Brown & Root, and Burden.

Esso's line . . . Esso disclosed a month ago the site for its ocean-loading terminal at Marsa el Brega on the Gulf of Sirte about 100 miles north of Zelten field. Present plans call for building the 30-in. gravity-flow pipeline along a straight-line route.

The pipe for the Esso line will be floated ashore, with the first shipload due at Marsa el Brega before the end of this month (OGJ, May 30, p. 76).

Contract for the novel floating project was granted to a new joint-venture company, SAASCAM, composed of a Libyan construction firm and an American drilling contractor. The first four initials of the company are those of Sayed Abdalla Abed Senussi, prominent Libyan businessman and a cousin of King Idris. The CAM represents the interest of Camdrill International Drilling Co.



Zelten still hot . . . Not even Esso's first dry hole at Zelten, the sixth well drilled in the field, has dulled the company's enthusiasm for its find.

Zelten 6 was abandoned last month at 8,138 ft. Company engineers say the well apparently limits the productive area to the west.

"But, we haven't located any north limit yet," an Esso spokesman says confidently.

The Zelten find is by far the best in Libya to date with the first two wells testing 17,500 and 15,000 bbl. daily, but Oasis has high hopes for another major field to the south.

If later drilling confirms Oasis hopes for its big block 59 to the south of Esso's field, it will undoubtedly be interested in participating in the Esso pipeline to the north.

The well which might spur Oasis in this direction is B1-59 which had disappointing test results because of a faulty completion. The company believes two more wells now being drilled on the same block will prove another major field.

The Oasis line . . . The primary field to be served by the Oasis line—at least thus far—is Dahra at the southern edge of Oasis block 32.

This field, with seven producers, will already produce 12,000 bbl. daily, on the basis of drill-stem tests. Its potential is undoubtedly much greater.

The two latest producers, F7 and F8, were completed last week. The first tested at the rate of 2,000 bbl. of 42° crude a day from 3,150 ft.

South and slightly east of Dahra, Mobil International has established commercial production in what is apparently an extension of the Oasis field. Mobil completed Hofra 2 at the rate of 1,500 bbl. daily less than a month ago. The company has a rig busy on an offset in this same area.

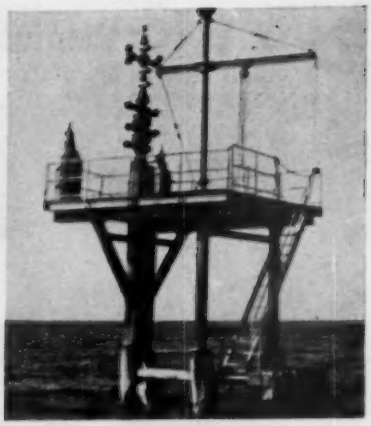
The Mobil production so near the Oasis field would indicate that Mobil will be interested in participating in the new pipeline.

Adjoining Oasis block 32 to the west is the Esso-Libyan American Mabruk field with three wells.

Esso took over the operation in this area under a farmout agreement with Libyan American, owned jointly by Texas Gulf Producing and W. R. Grace & Co. Esso is now at work earning a 51% interest in the block by matching the investment made by Libyan American.

This venture, called Esso Syrte, is certain to be included in the Oasis pipeline to the north.

ONSHORE base is being built for headquarters of Japanese operation in Persian Gulf. Dredge is digging a tanker channel to wharf location.



SECOND PRODUCER in offshore field is 25 miles out in the Gulf.

Arabian Oil Steps Up Persian Gulf Activity

- The Japanese company has completed two wells in the Neutral Zone and is about ready to complete a third. Three rigs may be drilling in this field soon.

THE Japanese-owned Arabian Oil Co. may add a third drilling rig in a sharply stepped-up effort to develop its offshore Persian Gulf oil field.

The company has completed two wells off the Saudi Arabia-Kuwait Neutral Zone and is about ready to complete the third with the single rig now in use. A second rig is due to spud in the near future, and contractors are talking with the Japanese now about a third rig.

With drilling operations getting up a real head of steam, the Japanese are pushing just as hard to build facilities quickly for moving the oil they've found. Work on shore facilities under a $11 million contract for a wharf and dredging are well under way.

A separate contract for building the company's first marine producing facilities has been let (OGJ, May 2, p. 92).

The wells . . . All initial signs that the Japanese have a major new Persian Gulf oil field have been confirmed.

Khafji 1, the discovery, was completed January 31 testing about 6,000 bbl. daily of 26°-gravity oil from the Burgan sands at 5,470 ft. The well was drilled in more than 100 ft. of water and more than 25 miles offshore from the Neutral Zone.

Khafji 2, located 2½ miles southwest of the discovery, was completed April 1 with a similar flow and from the same formation. The third well, to be completed within a week, is 1 mile southeast of the discovery well.

The first two wells were drilled in about 60 actual drilling days, but engineers and contractors believe that future wells can be drilled in 35 to 40 days.

International Drilling Co. has all the work in the field up to now using a three-legged LeTourneau mobile platform serviced by a tender. The equipment belongs to Reading & Bates Drilling Co., Tulsa.

A second rig to be used on a fixed platform and served by a tender will be put into service this month by Seacat Offshore Drilling Co.

There has been nothing official about the addition of a third rig, but at least three contractors have talked to the Japanese about additional equipment and at least one has submitted a formal bid.

The project . . . The Japanese concession covers more than 15,000 sq. miles off the Neutral Zone and adjoins the region where Arabian American Oil Co. developed the Middle East's first offshore oil field at Safaniya off Saudi Arabia.

The company let a contract in February for dredging a tanker channel, building a wharf, and other shore facilities to handle the operation already under way at sea. Pomeroy Construction Corp., San Francisco, and Hawaiian Dredging & Construction Co. are doing this work.

The tanker channel leading to deep water will be 18 ft. deep, 250 ft. wide, and a mile long. The contract also includes a 500-ft. wharf, work-camp buildings, and about 18 miles of roadway on shore.

A month later the Japanese let a contract to McDermott International, Inc., Houston, for production facilities at the marine field. Initial work will consist of a separation unit with nine flow lines and mooring for five T-2 tankers, which will be used as floating storage.

The Japanese are making just as many preparations to receive the oil in Tokyo. A new oil-storage company, Yokkaichi Yuso, has been formed to handle the crude when shipments begin early next year. The new company will be owned 60% by Daiko Oil Co. and 40% by Japan Petroleum Trading Co., parent of Arabian Oil.

Japan Petroleum Trading has also ordered two 46,000-ton tankers to move the crude. Both are slated for delivery early in 1962. In the meantime, the company has a 41,300-ton tanker under a 5-year contract.

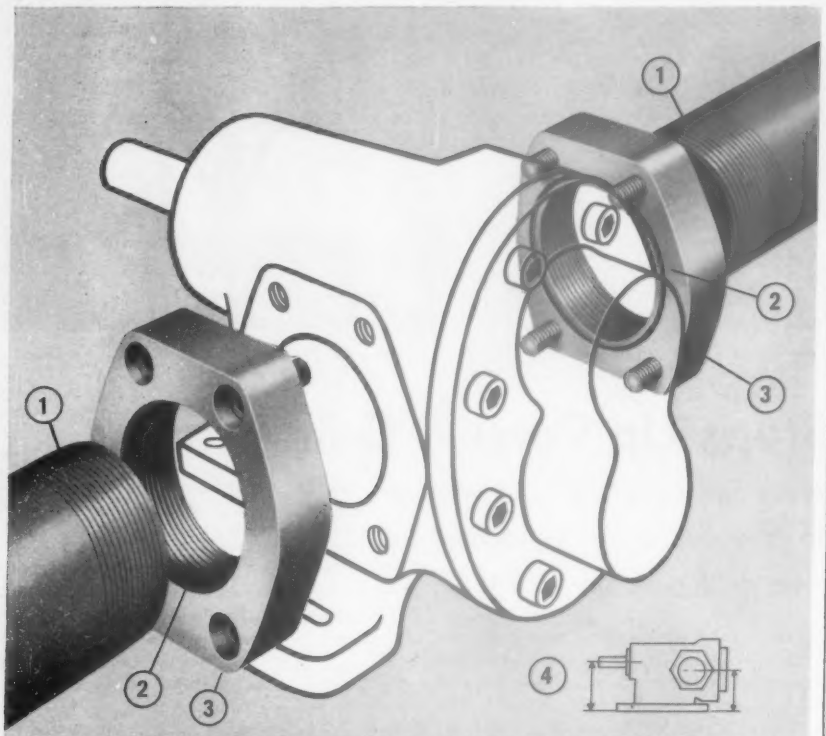
Iran Plans Sarajeh Gas Line

NATIONAL IRANIAN Oil Co. is making plans to tap its big new natural-gas field at Sarajeh, south of Teheran.

The government company has signed a contract with SNAM Progetti, a member of Italy's ENI group, for a preliminary survey for an 87-mile pipeline to Teheran. The Italian firm also will prepare specifications. When the survey and specifications are completed, NIOC will invite bids for construction.

NIOC says Sarajeh structure has reserves of more than 7 trillion cubic feet, ranking it as the fifth largest in the world.

Now from Brown & Sharpe...

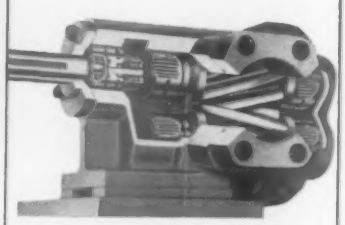


1 Standard pipe connections fit 2", 3" or 4" pipe directly, without extra fittings.

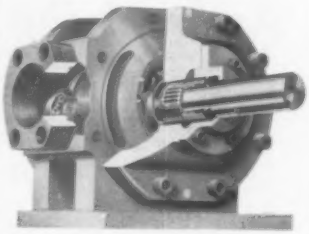
2 Inlet and outlet are same size.

3 Replaceable pipe flanges of ductile iron can be quickly changed to eliminate pump replacement caused by damaged threads.

4 Mounting dimensions help assure convenient replacement of other pumps.



New B&S "300" series rotary gear pumps. For pressures to 300 psi; caps. of 40, 60, 90, 125, 175 gpm.



New B&S "700" series gerotor pumps. For pressures to 1000 psi; caps. of 20, 30, 40, 60, 80 gpm. (Note: This highly-efficient design has unusually long service life, because contact between its inner and outer elements progresses at only 1/9 driven speed.)

a brand new line of rotary pumps with 4 big advantages for low-cost installation

You save on maintenance and get longer life, too

These new B&S rotary pumps are designed specifically for the Petroleum Industry.

They are constructed simply, with standard bolts and screws, for easy maintenance. They are equipped with roller bearings and replaceable wear plates, for extra-long service life. They save you money right down the line.

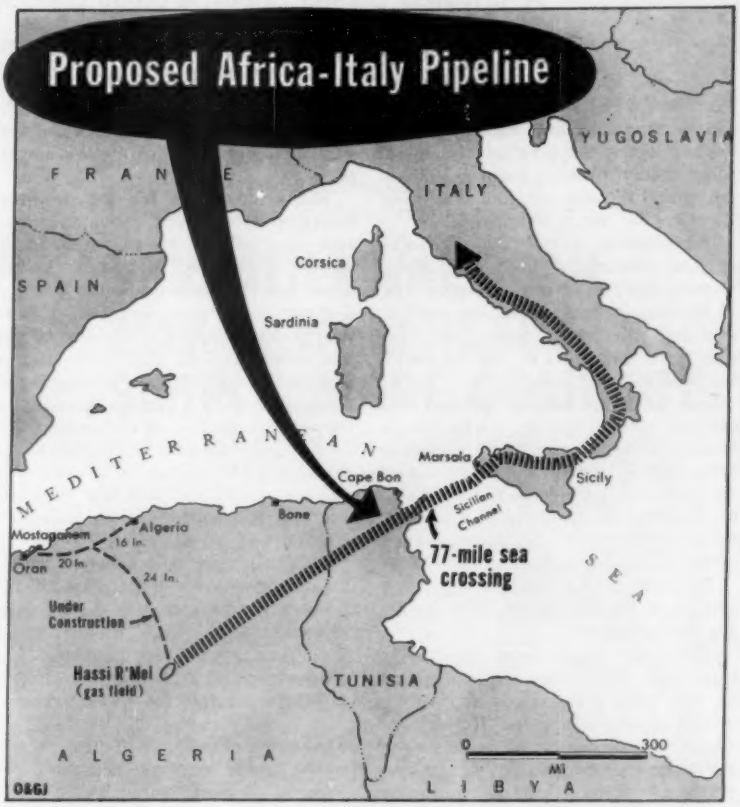
Rugged field tests have proven these pumps every bit as efficient and reliable as intended.

To start saving money on pumps, contact your oil field supply house about new Brown & Sharpe pumps. Ask them for a catalog, or write: Hydraulics Div., Brown & Sharpe Mfg. Co., Providence 1, Rhode Island.

Brown & Sharpe PRECISION CENTER

Trans-Mediterranean Gas Line Studied

. . . as part of major system from Hassi R'Mel field in French Sahara to Sicily and Italian mainland.



ENGINEERING studies are in progress for a proposed natural-gas pipeline across the Mediterranean Sea from North Africa to Sicily.

A French ship has completed a preliminary survey of the sea bottom from Cape Bon, Tunisia, to Marsala, Sicily. A detailed study of the bed of the 77-mile-wide Sicilian Channel is starting this month. Italian groups backing the project expect to know by this fall whether their plan is feasible.

The submarine crossing at the Sicilian Channel would be part of a major pipeline system carrying gas from big Hassi R'Mel field in the French Sahara to Sicily and the Italian mainland. Half a dozen of Italy's biggest business groups have set up a new company, Soc. Siciliana Metanadotti (SOSIM), for the project.

The Italian venture is the latest proposal to tap the 30-trillion-cubic-foot gas supply in the 4-year-old field. Earlier this year, Conch International Methane, Ltd., owned by Royal Dutch-Shell, Continental Oil, and Union Stockyards of Chicago, made a preliminary agreement with the French for a gas-liquefaction plant on the North African Coast. The French have a 24-in. gas system under construction that will start supplying local consumers next year.

Partners in SOSIM are Edison Power, Italcementi, Fiat Motor, Sicilian SGES Power, Bombrini Parodi Delfino Chemical, and Montecatini. They also are surveying markets for Saharan gas in Sicily and on the mainland, and are considering an extension of the system later into West Germany.

The distance of a line from Hassi R'Mel to Italy via the Sicilian Channel would be roughly comparable with pipelines from the U. S. Gulf to markets in the Northeast. It is 560 miles from the field to Cape Bon, 77 miles to the Sicilian Coast, and a route well into northern Italy would run less than 1,000 miles further.

Conch agreement . . . Conch International will have half interest in a new company, Cie. Algierienne du Methane Liquide (Camel), which will build a gas liquefaction plant on the Mediterranean Coast jointly with the discoverers of Hassi R'Mel and French banking interests. The producing companies, SN Repal and CFP (A) will split 26% interest, while Soc. Algerie de Development, Air Liquide, and Bureau de Recherches will hold the remainder (OGJ, Apr. 11, p. 98).

Gas for the liquefaction plant will be fed by a 300-mile pipeline system now under construction. A 24-in. trunk is being laid northward from Hassi R'Mel to a point well south of the coast. From there, a 20-in. branch will run westward to Arzew, with feeders to Oran and Mostaganem. A 16-in.-branch will extend from the main trunk eastward to Algiers.

The system is scheduled to open in the spring of 1961 with a reported initial capacity of 145 million cubic feet daily. This could be doubled with the addition of pumping stations. Algeria's existing potential market is estimated at 50 million cubic feet daily.

Pricing plans . . . The French will have a special company to set gas prices. SN Repal and CFP (A) will jointly hold 49.5%. The nationalized gas and electric utility, Electricite et Gaz d'Algerie, will have another 49.5%. The government will own the remaining 1%.

Export price for the gas has not been set. Cost of gas to major users who come in later will vary, depending on the end use. But the average delivered price will be equivalent to 18.2 cents per M.c.f. Gas used in petrochemicals reportedly will cost 20.8 cents. Established industries, including Electricite et Gaz d'Algerie, and new medium users will pay 28.6 cents.

Exact composition of the gas will not be determined until the field is on steady production. But after field processing, the gas will include about 83% methane, 7% ethane, 2% propane, and 2% butane and heavy hydrocarbons.

Hassi R'Mel has a potential of 200 million cubic feet daily and its limits are not defined. Producing wells cover an area of at least 50 miles southwest to northeast, and at least 40 miles wide (OGJ, Feb. 1, p. 82).

Arab Dream of Refining Crude To Be Realized

• A privately owned Saudi Arabian company plans a refinery on the Red Sea. Its output would cut Aramco's local markets by some 50%.

A PRIVATELY owned Saudi Arabian refining company, with the blessing and active support of the Saud ruling family, plans to build a 20,000-bbl. daily refinery on the Red Sea coast of the Arab Peninsula.

The planned refinery would fulfill an Arab dream of becoming active oil men instead of only recipients of oil income. It would also take away at least half the local markets of Arabian American Oil Co., the country's big producer and refiner.

Last week the refinery project was still just a bit in the air. Radio Mecca broadcast that the contract has already been signed. Beirut newspapers said the deal has been closed with Ralph M. Parsons Co., Los Angeles, for engineering, construction, and operation of the $20 million plant.

Parsons officials both in Los Angeles and New York say the reports are premature.

There are a number of unanswered questions. Middle East announcements of the plan said simply that crude would be shipped to the 700-acre refinery site southwest of Jeddah from the eastern provinces of the country where Aramco produces 1,200,000 bbl. daily. Whether the crude would be bought from Aramco or furnished the new refining company from Saudi royalty was not clear.

Members of the royal family will hold a large block of stock in the company, but it is not a government project.

Marketing plans for the refinery throughput over and above the consumption of the Hejaz, or western provinces, region of Saudi Arabia have not yet been disclosed.

Aramco last year marketed an average of about 8,780 bbl. daily in the entire country. At least 50% of this distribution was made through the company's bulk plant at Riyadh, in the western portion of the country.

This daily product distribution broke down to 4,450 bbl. of both motor and aviation gasoline; 2,220 bbl. of diesel fuel; 1,300 bbl. of kerosine; and about 270 bbl. of asphalt.

Products sold both to the government and private consumers in the western provinces moved by the government-owned Saudi Railway from Ras Tanura. Aramco paid the government almost $2½ million last year in freight charges for this movement.

The new refiner . . . Beirut reports of the new refinery quoted John Boles, Parsons' project manager, as saying work will start immediately and the plant will go on stream before the end of 1962.

The site was granted by the government as a refinery concession to the newly organized Saudi Arabian Refinery Co. (SARCO) for a 40-year term. The concession can be renewed for another 40 years.

The planned plant will include a 20,000-bbl.-daily crude and vacuum distillation unit, an asphalt plant, a catalytic reformer, desulfurizers, and an ethyl blending plant.

Output will include a full range of products including motor and aviation gasoline, jet fuels, kerosine, diesel fuel, butane, propane, fuel oil, and bunkers.

The new plant is the project of Amir Mohammed Ibn Saud, one of the King's sons, who calls it "an important keystone in the industrial development of our country."

He said last week that half the stock in the company will be offered to the Saudi public. The other half will be divided among himself, Amir Saad Ibn Saud, Ibn Abdul-Aziz, Amir Musaed Ibn Saud, Amir Khaled Ibn Turki, Shaik Abdulla Al-Suleiman, Dr. Ahmed Fahim, Rashad Dabbagh, and the Riyad Bank.

The planned refinery is the second for the Red Sea area disclosed in 2 weeks. The Russians have agreed to lend Ethiopia the money to finance a 5,000-bbl. plant at Assab (OGJ, June 6, p. 89).

FOREIGN BRIEFS . . .

Imports of LPG from the Middle East to Japan are being planned by General Bussan Trading Co. The firm is seeking permission from the Japanese Ministry of Trade to import 32,000 tons next year, 37,000 tons in 1962, and 44,000 tons in 1963.

A $15-million contract has been awarded to Matthew Hall & Co. for construction of polyolefin facilities at Carrington, England, for Shell Chemical Co. The new unit will produce 30,000 tons per year of polyethylene and polypropylene. It will go into operation next year.

"Shell Naiguata," the second of two 33,000-ton tankers for Cia. Shell de Venezuela, has been launched at Glasgow, Scotland. The vessel will fly the Venezuelan flag.

Drilling & Exploration Co., Dallas, has been awarded a drilling contract for several exploratory wells in Portuguese Guinea, West Africa, by Esso Exploration Guiné. Esso is preparing to launch its first exploratory activity in that country. Drilling equipment will arrive at the port of Bissau in Guinea about October 1.

A 46-mile 15¾-in. loop to an 8-in. natural-gas system from Emsland fields to the Ruhr will begin deliveries by April 1961. Capacity of the new line will be 106 to 141 million cubic feet daily. A four-company group, Deilmann - Elwerath - Preussag - Wintershall, will sell the supplies to Ruhrgas AG.

Chemical Construction (G.B.), Ltd., will build a plant to decompose sulfuric acid sludge produced at Royal Dutch-Shell's refinery at Pernis, Netherlands. The firm is a wholly-owned subsidiary of Chemical Construction Corp., New York.

Shell Petroleum's Stanlow refinery is turning out 140-145° F. micro-crystalline wax equal in quality to the U. S. product. Shell Chemical is the marketer in the United Kingdom and Eire.

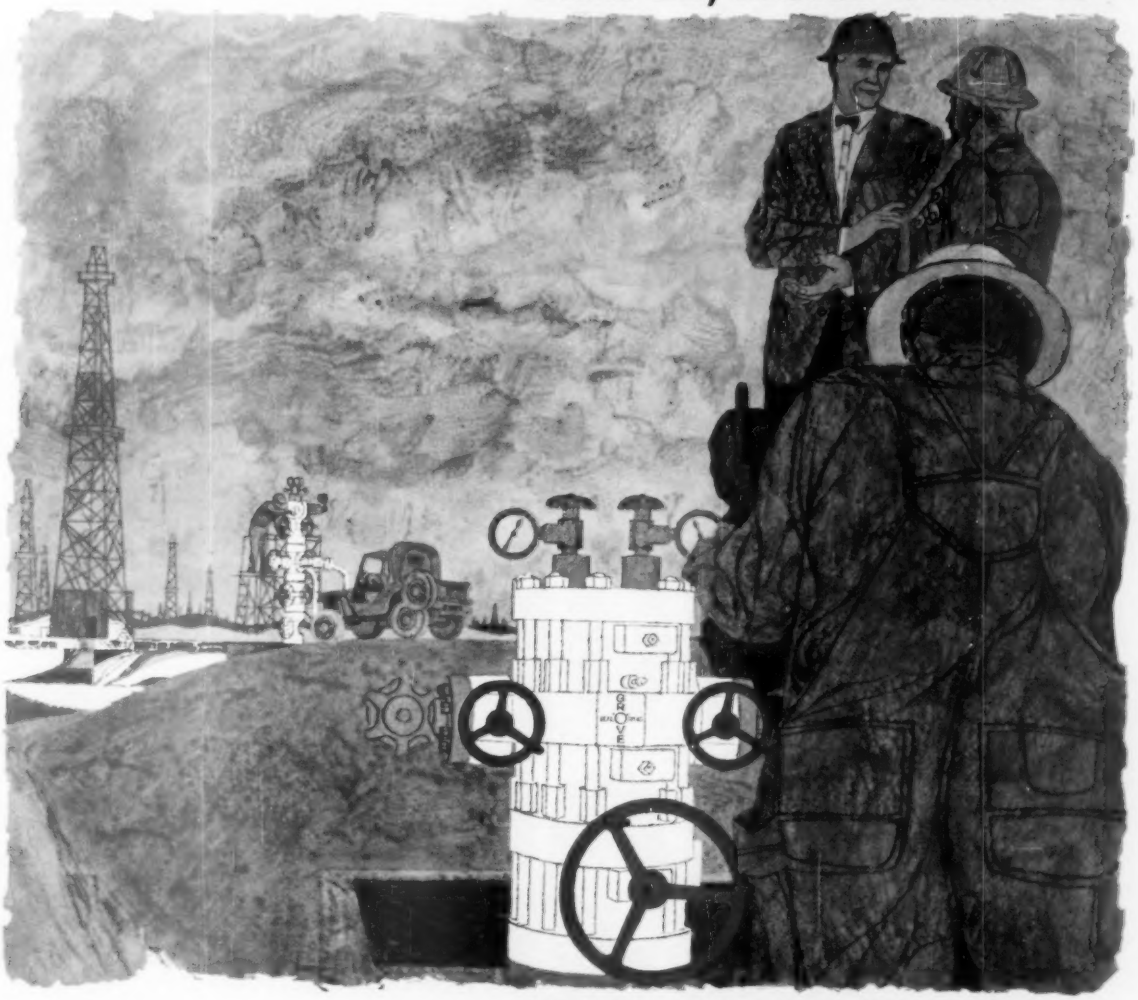
A stratigraphic test has been started in Senegal, West Africa, by Ste. des Petroles du Senegal, in which the BP Group has half interest. The well, Nord Casamance 1, is located south of the Gambian frontier.

Spain is considering a proposal by Jersey Standard and a local company, CEPSA, for a $26-million petrochemical plant. The facilities would be built in northern Spain.

Grove Valv-Pak offers many advantages: the lightweight and compactness of an integral Christmas Tree valve assembly—plus the flexibility of conventional assemblies permitting any single component to be changed in the field without replacing the complete unit. Unique Grove Valv-Pak construction permits factory tailoring to suit your precise needs for every single or multiple completion. Proven Grove protected Seal-"O"-Ring® design, featured in the Valv-Pak, assures a positive, bubble-tight seal, eliminates the need for lubrication. Write for Valv-Pak information.

Marvin Grove talks Christmas Trees

VERSATILE VALV-PAK MAKES WELLHEADS SIMPLE, MORE COMPACT



GROVE PRODUCTION VALVES

GROVE VALVE and REGULATOR COMPANY

a subsidiary of Walworth

6529 Hollis Street, Oakland 8, California

Offices throughout the U.S. and in Western Canada

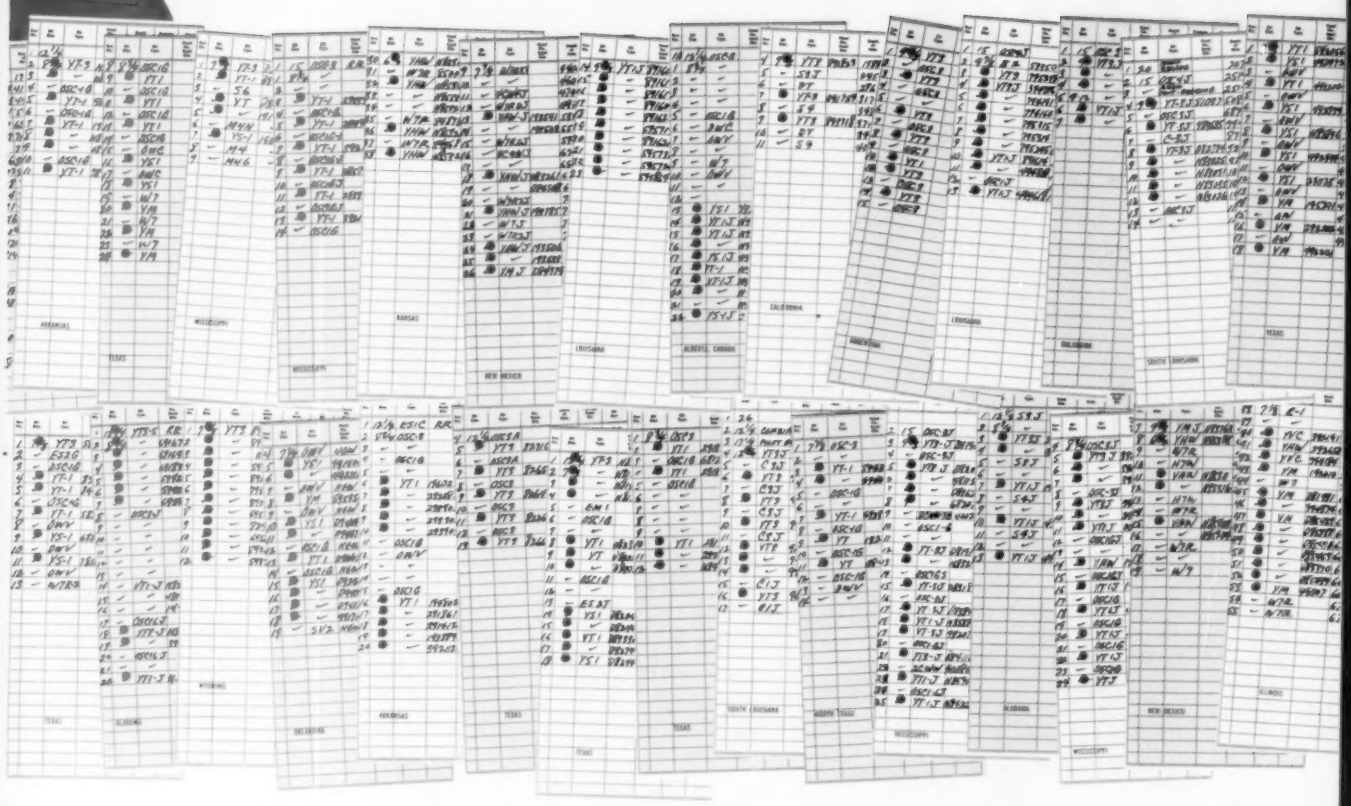
6325

MORE

RIGS ARE RUNNING

MORE

REED BITS



and here's why . . .RECORD AFTER RECORD, FROM FIELD AFTER FIELD, PROVES IT!

The bit records shown above are representative of the competitive job Reed Y bits are doing all over the world.

Most people are using Reed Y bits today because they know that when they put a Reed Y bit in the hole it will do the job and do it right.

The performance of Reed Y bits in the past year has been so good that we have not, in some cases, been able to supply the quantities that have been demanded by our customers. To remedy this, we have expanded our production facilities and are now in a better position to supply your needs.

An expanded research and development program has enabled us to provide all the most popular sizes and types for immediate delivery and we are adding additional sizes and types on a regular, continuing basis. Each new size and/or type requires many hundreds of hours of research, engineering, and testing. When we release a bit to the field for sale, you can rest assured that it will dig with the best of them.

Run Reed bits on your next well—you'll be pleased with the results.

REED ROLLER BIT COMPANY *Houston 1, Texas* EXPORT OFFICE: 1011 INTERNATIONAL BLDG., NEW YORK 20, N.Y.

GULF COAST, MID-CONTINENT, ROCKY MOUNTAIN AND CANADIAN DISTRIBUTOR FOR MARTIN-DECKER PRODUCTS.

REED

REED'S ROLLIN'

NOW MID-CONTINENT SLUSH PUMPS

EXPANDING the Mid-Continent Line of Drilling Machinery

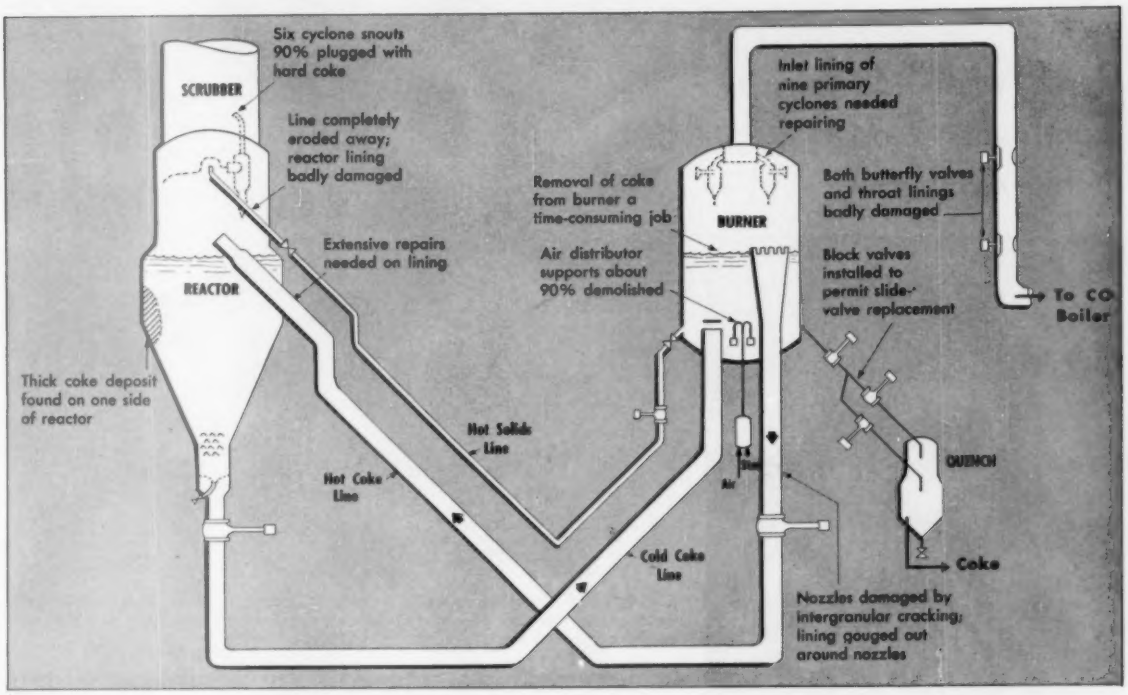
Since 1938, Mid-Continent Supply Co. has pioneered and field-proved the Emsco Pump throughout the oil fields of the world. Mid-Continent now proudly places its familiar world and derrick emblem on this series of pumps which includes models from 125 to 1000 horsepower capacity. These pumps and parts are 100% interchangeable with the Emsco line. And, Mid-Continent backs these pumps with fast, dependable field service from strategically-located parts and service centers. Call your local Mid-Continent representative today for assistance in selecting a Mid-Continent-Emsco Pump or parts for your drilling requirements.

SP1-0

MID-CONTINENT SUPPLY CO.

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

Mid-Continent Building, Fort Worth, Texas • Export Division: 45 Rockefeller Plaza, New York 20, N.Y. Cable: MIDCUMPORT NYK


Six cyclone snouts 90% plugged with hard coke
SCRUBBER
Line completely eroded away; reactor lining badly damaged
Extensive repairs needed on lining
REACTOR
Thick coke deposit found on one side of reactor
Hot Solids Line
Hot Coke Line
Cold Coke Line
Removal of coke from burner a time-consuming job
Air distributor supports about 90% demolished
BURNER
Inlet lining of nine primary cyclones needed repairing
Both butterfly valves and throat linings badly damaged
Block valves installed to permit slide-valve replacement
To CO Boiler
QUENCH
Coke
Nozzles damaged by intergranular cracking; lining gouged out around nozzles

These trouble spots were discovered by Tidewater during a turnaround shutdown after

Coker runs a record 578 days

D. H. STORMONT
Refining Editor

TIDEWATER OIL CO. recently turned around the big fluid coker at its Avon refinery near San Francisco after having established the longest run in fluid-coker history.

On stream continuously since March 23, 1958, the 42,000-bbl. unit was shut down last October 22 for a planned turnaround. During the 578-day run the unit processed about 16,776,000 bbl. of charge stock, or an average of 29,050 bbl. daily.

When it was completely opened for inspection a few days later, most of the components part were found to be in excellent mechanical condition. The piping was generally found to be in better condition than expected, and the scrubber cleaner.

But there were trouble spots also. Some of these developed into bottleneck jobs, as will be discussed later on.

The turnaround, which also involved the carbon monoxide boiler and gas plant, was completed on November 30. Extent of the work done during the shutdown is best illustrated by the approximately $1,000,000 cost. Some 114,000 man-hours of contractor labor were involved, better than 88% of which were spent on the coker.

Planning the turnaround. Since there was no precedent to serve as a guide as to when a turnaround would be required, Tidewater started planning the job about 12 months before the shutdown.

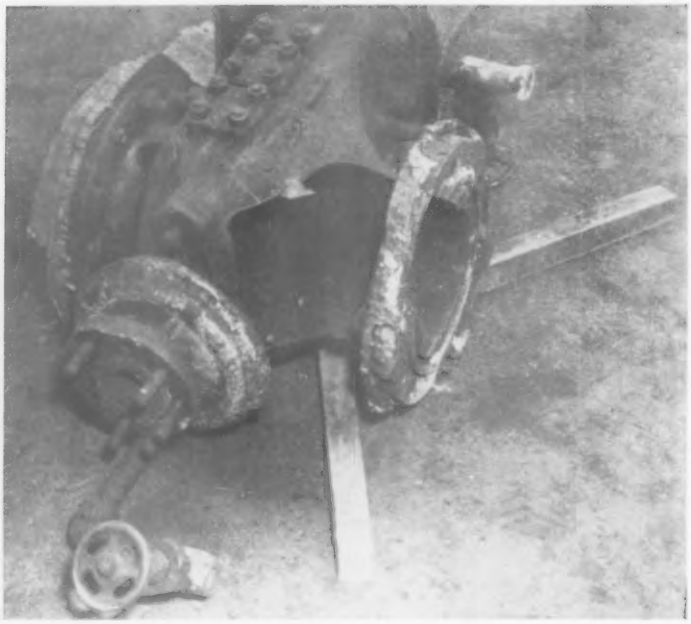
Decision to bring the unit down last October was based on two reasons. First, excessive pressure drop had developed across the reactor cyclones. The other was that plugging also was causing excessive pressure drop across the fractionator. Both were adversely affecting the unit's throughput. During the last month's operation, runs had been limited to 75% of rated capacity. Although the reactor was being operated near the top pressure limit, its throughput was limited to about 33,000 bbl. daily.

Personnel from the operating, materials and construction, inspection, and engineering departments were involved in the initial meeting. At this time a shutdown work list was developed and logistics for the turnaround planned.

At subsequent meetings, held at about 3-month periods, the work list was carefully scrutinized, and additions and deletions discussed. A final meeting was held 2 weeks prior to the shutdown to complete the work list.

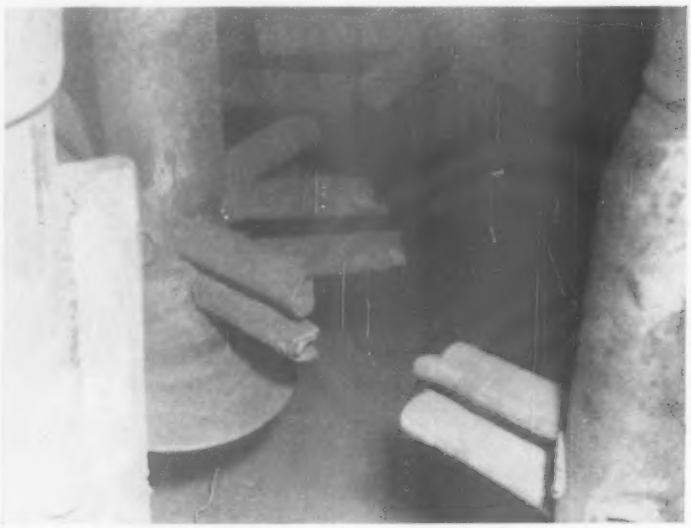
Due to careful planning, the turnaround was carried out more or less on schedule. As usual, some items had to be replaced which had not been foreseen. Since the turnaround occurred during the steel strike, this involved more of a problem than would normally be the case. With the turnaround contractor's assistance, some items were quickly secured. In other

Here's what Tidewater found when it opened its big Avon coker



REMAINS of slide valve used in coke-withdrawal line show why, months before the turnaround, it had been necessary to box in the valve so it could be operated.

EROSION badly damaged the portion of the hot-solids line inside the reactor dome.



ABOUT 90% of the carbon-steel bracing on the burner air-distributor piping was destroyed, presumably by sulfidation. Stainless steel bracing replaced them.

cases a change in metallurgy was necessary.

Shutdown proceedings were started on the morning of October 22. The unit was completely turned over to the mechanical department for turnaround repairs four days later.

Turnaround repairs. Condition of the various parts of the coker, and the steps taken to repair or correct the damage, are discussed in following paragraphs. The simplified flow diagram shows the locations of the trouble spots. Photographs show the condition some of the equipment was in before being repaired or replaced.

... **The reactor** was found to be in very good mechanical condition, showing very little wear or damage. However, a deposit of coke, some 5 ft. thick at points, was found along one side in the vicinity of the No. 6 to 8 feed nozzles. It was so thick in spots that some feed nozzles had been plugged over. It was hard enough to require the use of air hammers to break up for removal. Remainder of the wall was covered with some 4 to 6 in. of coke.

Other than causing an instrument lag, (temperatures indicated were somewhat lower than actual) the coke deposit had not seriously affected operations prior to the shutdown. The operators learned to anticipate this time lag in temperature measurements and compensated for it. The deposit was removed by chipping with air hammers to a thickness of about 1 in. during the turnaround.

The portion of the hot solids line

A NEW HOT-SOLIDS LINE had to be installed inside the reactor dome. Note the extensive area where wear cement and hex steel had been gouged out from the wall.

within the reactor dome was completely worn out, for all practical purposes. This 14-in. alloy-steel line transfers about 4 tons of coke per minute from the burner to the dome section. This keeps the dome free of coke deposits, "scouring" the inlet horns of the cyclones, and superheating the vapors.

Erosive action of the hot coke on both the inside and outside of the line had worn away portions of the line. Wear cement and hex steel on the reactor wall in the vicinity of the inlet also had been gouged out.

A new section of alloy steel pipe was installed in the dome. To give it a longer service life, outside of the line was coated with hex steel and wear cement. The portion of the reactor shell around the line's inlet also was patched and an additional thickness of wear cement applied at the juncture to the shell.

Portions of the seven cyclone separators in the upper or so-called "gas shave-off" section of the reactor were in good condition, as was the scrubber tower on top of the reactor. However, six of the cyclone outlets in the scrubber portion were about 90% plugged with a moltenlike coke deposit. The material, 12 in. thick in spots, was so hard it had to be chipped out with air hammers.

Two liquid cuts are removed in the scrubber. The top cut is a heavy gas oil which is sent to a thermal cracker. The bottom, heavier cut is recycled to the coker reactor.

It was the plugging of the cyclone outlets, or snouts, which caused the pressure buildup in the reactor prior to the shutdown. Plugging reduced the efficiency of the cyclones, permitting them to pass more coke into the scrubber. This in turn required more scrubber bottoms to be recirculated to the reactor.

Just what caused the lavalike accumulation of coke is unknown. Tidewater engineers believe it could have been caused by faulty operation of the steam coils, the erosion of the hot solids line, or for some reason the liquid level in the scrubber had once unknowingly built up too high.

. . . Conditions inside the burner were worse than in the reactor, insofar as repair work was concerned. Four air distributor heads were broken, and about 90% of the 1½-in. steel bracing for the "candelabra" was demolished. Sulfidation is thought to have caused the latter.

The two-stage primary and secondary cyclones, generally speaking, were in good condition. Minor repairs had to be made to the hex steel and wear cement lining in the inlet horns of nine primary cyclones.

In the nine primary cyclones on the side above the cold coke inlet, little deterioration was found in the wear cement. The damaged ones were on the side opposite the coke-withdrawal line and the inlet from the elutriater vent.

The bracing originally installed for the air distributor piping was plain carbon steel. The new supports were constructed from Type 405, 18-8 stainless steel. Additional bracing of this type steel also was placed around the cold coke inlet line.

Biggest job connected with the burner, however, was that of removing the coke. Design of the huge vessel is such that some 250-300 tons of

coke remain in the bottom portion after it is shut down. Even though cooling steam was introduced, removal of the hot coke could not be started until 5 days after the shutdown. Then the coke was shoveled out, a time-consuming process. The entire job of cleaning out and repairing the burner required 2½ weeks . . . using 8-10 men per shift, 3 shifts per day and 7 days per week.

. . . The overhead burner line, which conducts stack gases to the CO boiler, also developed into a bottleneck job. Size of the line (104-in. i.d.) permitted only a few men to work at one time.

Although the duct had a 4-in. lining of hex steel and wear cement, bare metal was exposed at spots. Both butterfly-valve throat areas were badly eroded, as were the butterfly shafts and housings.

The three slide valves in the coke-removal line had to be entirely replaced. In fact, during the last several months of operation they were so damaged that makeshift controls had been used.

This damage is believed to have resulted from steam which is constantly introduced to keep the valve seats free of coke. To correct this situation, block valves were installed in addition to the slide valves. Also less aeration is now being used.

THE "HAT" on the hot-coke riser inside the reactor had to be repaired because of coke erosion.

Transfer lines. The cold-coke line was found to be in good condition but the hot-coke line was in need of extensive repairs.

Because of the line's size (less than 45 in.), repairing it also developed into a bottleneck job. At the point where it made a 30° bend to go into the reactor, extensive erosion had occurred on the upside of the bend. Wear cement, insulation, and hex steel had been completely eroded away. Several patches were applied to the outside of the pipe at this point, in addition to repairing badly eroded sections of the interior.

In the hot-coke standpipe, steam is continually introduced through some 70 aeration nozzles in order to keep the coke fluidized. All of the nozzles were found to be suffering from intergranular cracking. Some of the cracks extended back beneath the lining. Areas of wear cement and hex steel thus had to be gouged out to make repairs. The situation was corrected by inserting ½-in. nozzles inside the original 1-in., and by patching gouged-out spots.

Fractionator repairs. Inspection of the fractionator revealed what had created the extremely high pressure drop there. Coke carryover from the improperly functioning reactor cyclones had carried through the scrubber into the fractionator. There it had almost completely plugged the bubble caps of the first seven trays.

The black, solid residue on the caps was so hard it was necessary to remove them for cleaning. Analysis of the residue showed it to consist of 83% carbon.

Naphthenic acid corrosion was found to have caused minor damage to the tray areas and supports. More corrosion was found in the light-gas-oil line to the stripper, requiring approximately 10% of it to be replaced.

Because of the severe corrosive conditions, it had been necessary to replace all fractionator bottom pumps some time before the shutdown. The plain steel housings and impellers in both the gas-oil and naphtha pumps proved unsatisfactory. Chrome-nickel steel (Type 316, 18-8) housings and impellers were installed in the gas-oil pumps. Because of its better resistance to chloride corrosion, monel was used for the housing and impeller of the naphtha pumps. Both types were found to be standing up well.

Job coordination. The relatively short period alloted for the turnaround, the large size of the unit, and the amount of maintenance repairs required, necessitated the use of a contractor to supplement the regular maintenance crews. Except for instruments, the turnaround contractor performed all work on the coker. Tidewater crews took care of the CO boiler, and performed about 90% of the gas-plant maintenance.

During peak work loads, approximately 750 men per day were engaged in the turnaround. With the exceptions of bottleneck jobs, the normal work schedule consisted of two shifts per day, six days per week. On the bottleneck jobs, maintenance was continuous during the shutdown.

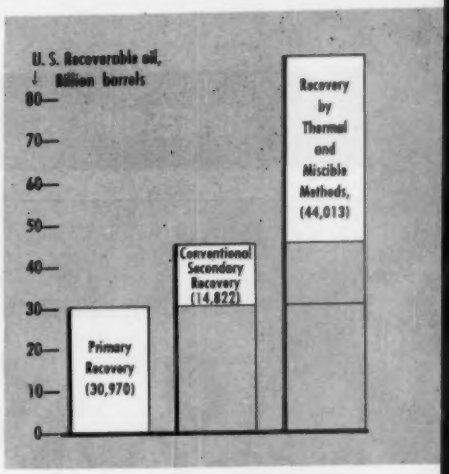
In carrying out the turnaround, Tidewater's shutdown coordinator of maintenance and construction, his coordinators, and coker operating department supervisory personnel worked directly with their counterparts in the contractor organization.

Repairs were completed and the unit turned back to the operating department on November 26. After the various drying-out and heating-up stages, fresh feed was started on November 30—and run No. 5 was on its way.

The 578 days of continuous operation set by run No. 4 will be difficult to duplicate, Tidewater engineers believe. It is expected that the changes in metallurgy will prolong the life of lines and equipment where erosion and corrosion were a problem. Likewise the other changes will prove helpful. Time alone will give the answer.

Can we salvage another 44 billion barrels?

Yes, say the experts. And it will come from new recovery methods like in situ combustion and miscible-phase flooding. IOCC committee report shows U. S. is self-sufficient in its oil requirements in the foreseeable future.



BY PAUL D. TORREY

SINCE the last report of the Secondary Recovery and Pressure Maintenance Committee, no new states have been added individually to the schedule. However, Alaska has been added to "other states" even though little is known about its oil resources. Similarly, it is difficult to appraise the potential of some of the other states where the discovery of important fields has been of recent date. It is a well-known fact that all figures relating to oil reserves are changed from time to time as new fields are discovered or as more information is obtained about existing fields, so Alaska will probably not prove to be an exception from the historical experience of states in which oil was discovered at earlier dates. More oil likely will be found and produced in Alaska than present information indicates.

The statistics presented in Table 1 parallel, except for Column 6, those presented 2 years ago at the midyear meeting of the compact at Salt Lake City.[1] Increases can be expected in original oil in place (Column 1) as more oil is found, and in total oil produced (Column 2) as production has been maintained. However, oil production was lower in both 1958 and 1959 than in 1957 (Column 3).

Texas oil production dropped below 1 billion barrels in both 1958 and 1959. In 1959, Louisiana advanced ahead of California for the first time as the second - largest oil - producing state. The 1959 production of the 10 most important states along with their API proved reserves in numerical order are shown in Fig. 1.

After declining in 1957 from a previously established high in the preceding year, API proved reserves increased moderately in 1958 and substantially in 1959 to an all-time high of 31,719 million barrels.[2]

About this report . . .

Paul Torrey's report to the Interstate Compact Commission on United States Oil resources at the compact's midyear meeting at Detroit represents a continuation of studies that have been made periodically by the Secondary Recovery and Pressure Maintenance Committee. These studies are made to determine the amount of oil discovered in the fields of the United States and the amount that will be recovered from them.

This report is based on the fourth study of this type that the committee has made. The previous reports have been widely accepted by the industry, federal and state governments, and by organizations considering the sufficiency of the nation's mineral resources.

The committee's report this year has a feature not found in previous reports; the additional oil that may be recovered by new processes, such as thermal recovery and solvent extraction, is considered. It is recognized that there are uncertainties connected with the possible extent to which these new processes may be applied, and with the measure of their effectiveness, but the methods appear to hold enough promise that their effect on the nation's future oil production should be included in the report.

Contained in the report is a list of contributors of information listed in Table 1. Most of these contributors were appointed by the governors of the respective states, and should be recognized as being the leading authorities in this field. Thus, the information they have assembled can be accepted as the most reliable that can be obtained.

. . . and its author

Paul Torrey is chairman, Secondary Recovery and Pressure Maintenance Committee of the Interstate Oil Compact Commission. He is a member of the faculty of the department of petroleum engineering of University of Texas, and is a consultant in the fields of petroleum engineering and geology.

Born in Louisiana, he received his BS degree in petroleum geology from University of Pittsburgh in 1925 and his petroleum-engineering degree in 1927.

He has served with the Oil and Gas Division of the USGS and was affiliated with the Northwestern Pennsylvania Oil Producers Association as geologist and petroleum engineer, devoting most of his time to a study of the Bradford and Allegheny fields.

After a period of time in which he was primarily engaged in consultation, he assumed the presidency of Lynes, Inc., in 1948 where he engaged in the development of specialized tools for secondary-recovery and pressure-maintenance operations. In 1951 he formed and became a general partner in Oil Recovery Chemicals, Austin.

U. S. OIL RESOURCES (MILLION BBL.) AS OF JAN. 1, 1960

*Thermal and miscible-phase — 1st time these have been included

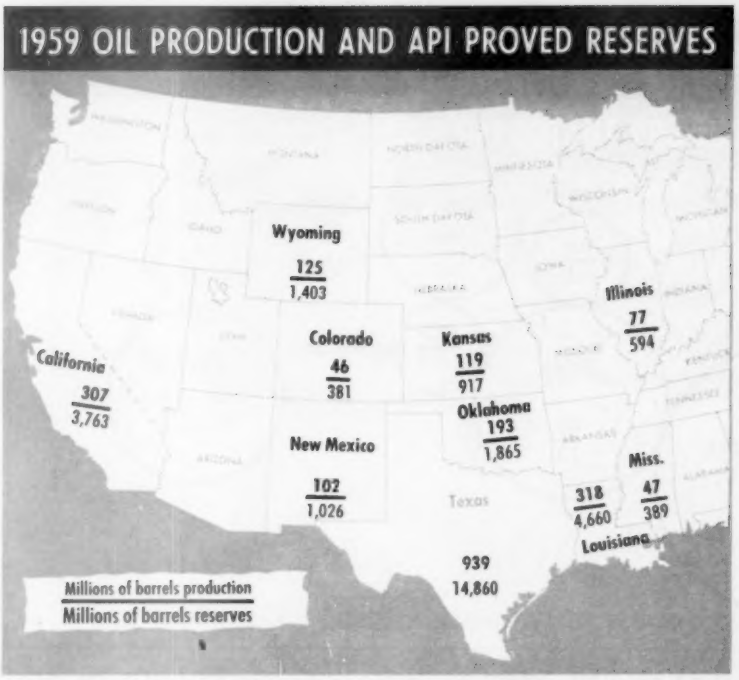
State	1 Orig. oil content of reservoir	2 Total oil prod. to 1-1-60	3 1959 oil prod. (API)	4 API proved reserves (A)	5 IOCC proved reserves	6 Add. reserves recoverable by new methods*	7 Add. reserves recoverable by gas and water inj.
New York	743	206	2	34	0	210	25
Pennsylvania	3,831	1,215	6	114	27	1,018	113
West Virginia	2,593	462	2	51	37	590	14
Kentucky	1,470	397	28	136	160	450	65
Ohio	4,592	661	6	74	61	376	7
Indiana	3,003	305	12	74	40	280	100
Illinois	7,352	2,154	77	594	335	3,110	810
Michigan	1,573	426	11	55	58	357	109
North Dakota	2,751	82	18	382	465	606	141
Nebraska	1,082	118	23	81	83	125	55
Kansas	15,450	3,196	119	917	825	1,500	125
Oklahoma	48,215	8,019	193	1,865	1,459	4,540	1,369
Arkansas	5,596	1,081	25	313	255	342	171
Alabama	358	30	6	34	69	111	111
Mississippi	3,307	634	47	389	661	1,322	150
Louisiana (B)	23,662	4,859	318	4,660	4,275	1,659	2,730
Texas (B)	112,106	22,906	939	14,860	15,528	16,046	4,958
New Mexico	9,960	1,376	102	1,026	887	3,984	996
Colorado	3,217	552	46	381	214	1,210	624
Wyoming	10,997	1,781	125	1,403	1,191	1,272	556
Montana	2,689	334	30	309	335	155	64
Utah	1,725	82	40	195	232	607	527
California (B)	62,048	11,750	307	3,763	3,763	4,113	1,000
Other States (C)	87	10	1	9	10	30	2
Total	328,407	62,636	2,483	31,719	30,970	44,013(D)	14,822
Change from 1-1-58	+18,500	+4,818	—76(E)	+1,419	+390	+9,530(D)	+1,727

Footnotes:
(A) API and AGA, "Proved Reserves of Crude Oil, Natural Gas Liquids and Natural Gas," December 31, 1959, Vol. 14.
(B) Includes offshore reserves.
(C) Includes Alaska, Arizona, Florida, Missouri, Nevada, South Dakota, Tennessee, Virginia, and Washington.
(D) In 1958 recovery by means of solvents and heat were not considered.
(E) Change from 1957 to 1959 production.

Source of information.

New York: Karney R. Cochran, vice president, Bradley Producing Corporation.
Pennsylvania: William S. Lytle, assistant state geologist, Pennsylvania Geological Survey.
West Virginia: Alvah J. W. Headlee, geochemist and chairman, West Virginia Secondary Recovery Committee.
Kentucky: Edmund Nosow, geologist, Kentucky Geological Survey.
Ohio: Based on 1957 report by Jack Cashell, president, Preston Oil Co., supplemented by Paul D. Torrey.
Indiana: H. R. Brown, Director, Division of Oil and Gas, Indiana Department of Conservation.
Illinois: Carl W. Sherman, head, petroleum engineering section, Illinois State Geological Survey Division.
Michigan: Gordon H. Hautau, geologist, Geological Survey Division, Michigan Department of Conservation.
North Dakota: Clarence B. Folsom, Jr., chief petroleum engineer, North Dakota Geological Survey.
Nebraska: H. N. Rhodes, director, Oil and Gas Conservation Commission.
Kansas: Albert E. Sweeney, Jr., director, technical services, Interstate Oil Compact Commission.
Oklahoma: F. H. Rhees, vice president, Sinclair Oil & Gas Co.
Arkansas: Edward A. Albares, director, Oil and Gas Commission.
Alabama: Robert C. MacElvain, assistant supervisor, Oil and Gas Board.
Mississippi: James F. Borthwick, Jr., chief engineer, Oil and Gas Board.
Louisiana: A. Fred Peterson, Jr., petroleum engineer, Department of Conservation with the collaboration of the Louisiana Secondary Recovery and Pressure Maintenance Committee.
Texas: Paul D. Torrey, department of petroleum engineering, University of Texas.
New Mexico: D. S. Nutter, chief engineer, Oil Conservation Commission.
Colorado: A. J. Jersin, director, Oil and Gas Conservation Commission.
Wyoming: J. Howard Barnett, petroleum consultant with collaboration of Wyoming Secondary Recovery and Pressure Maintenance Committee.
Montana: O. D. Blake, geologist, Oil and Gas Conservation Commission.
Utah: H. G. Henderson, chief engineer, Oil and Gas Conservation Commission.
California: G. B. Shea, chief, San Francisco Petroleum Research Laboratory, USBM.
Other states: Paul D. Torrey, department of petroleum engineering, University of Texas.

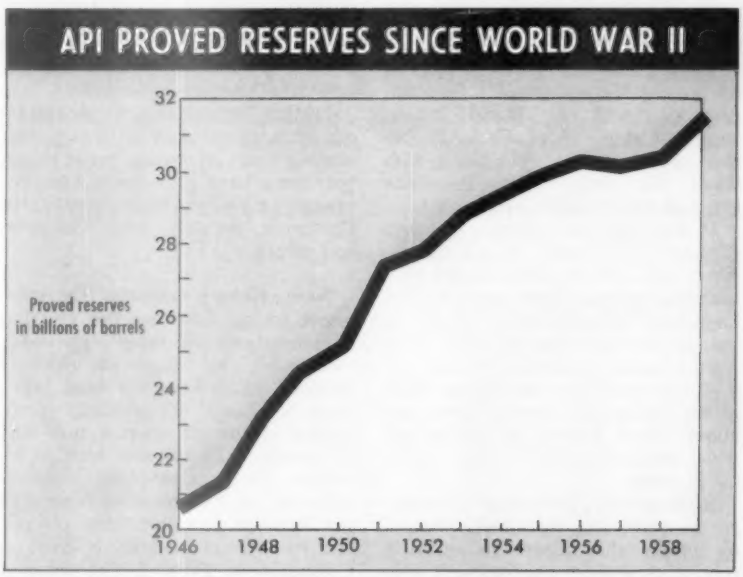
TABLE 1—THIS TABULATION of the oil resources of the United States includes, for the first time, the additional oil that we may expect to capture through thermal-recovery methods, and by miscible-phase flooding. All figures are in millions of barrels.



MOST IMPORTANT PRODUCING STATES are shown with their 1959 production figures and the corresponding API approved reserves as of January 1, 1960. Fig. 1.

API proved reserves have advanced continually, except in 1957, in every post-World War II year up to the present. The estimated proved reserves at the end of each year are given in Fig. 2. Note the almost uninterrupted annual increase.

It is notable that the big increase in reserves took place in the period from 1946 through 1955 during which period the average annual increase amounted to almost 1 billion barrels. Thereafter, the advance in reserves has been at a much more moderate rate except during 1959. This decline in the rate of reserve buildup cannot be attributed to any inability on the part of the domestic industry to find and produce oil. Rather it results directly from a substantial decrease in exploration and drilling activity which can be expected to continue as long as operators do not have adequate incentive to look for new oil fields.



PROVED RESERVES HAVE INCREASED at a fast pace since 1946 except for a slight slump during 1955-56. Fig. 2.

API proved reserves increased from 1957 to 1959 in Ohio, Indiana, Michigan, North Dakota, Nebraska, Arkansas, Mississippi, Louisiana, Texas, New Mexico, Colorado, Utah, and California. Some new oil has been found in Ohio, Indiana, and Michigan during the past 2 years. The most significant increases in proved reserves have been in North Dakota and Nebraska which have resulted from important new discoveries and from the wise application of pressure maintenance to existing reservoirs; in Louisiana from major offshore developments; and in the mountain states where exploration for new fields has been going on at a high level of activity. Mississippi improved its position moderately, and Arkansas, California, and Texas barely maintained their past position.

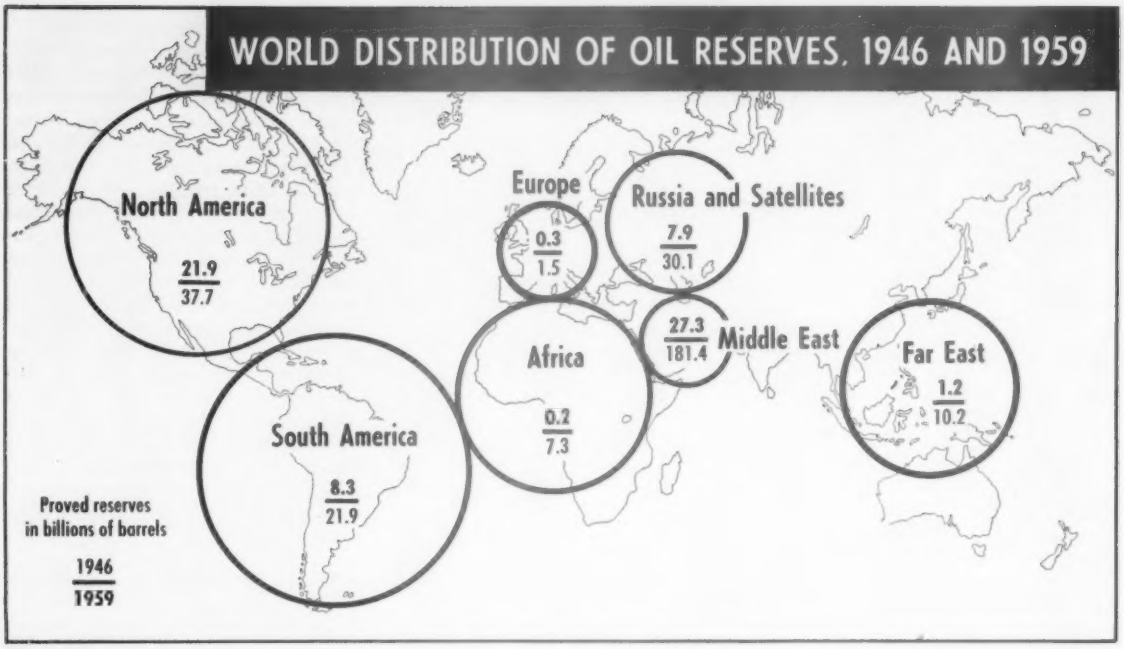
What's the world-wide picture? Although crude-oil reserves have increased substantially in the United States in post-World War II years the increase in this country has been mediocre compared to other parts of the world. Fig. 3 and Table 2, developed in large part from the 1947 World Oil Atlas[3] and from The Oil and Gas Journal's 1959 World-Wide Report[4] show this spectacular comparison.

The oil reserves in 1946 and 1959 of the most important oil countries are listed in Table 2, and shown graphically in Fig. 4.

It can be seen that the United States has dropped from first to fourth place in the world's crude-oil-reserve picture in a period of only 14 years and during this period its per cent increase in reserves was less than any of the other countries considered. It is pertinent to note that during this same period Soviet Russia found almost twice the amount of new reserves that the United States did even though it dropped from third to fifth-ranking position.

Even if we consider that all of the Western Hemisphere's reserves, amounting to some 59.6 billion barrels, might be available to the United States in an emergency, this is only about one-third of the proved reserves in the Near East alone and amounts to only about one-fifth of the total proved reserves of the world. It is obvious that the United States proved-oil-reserve position has deteriorated seriously in the post-World War II period.

What's the role of gas, water injection? The important part that fluid injection operations will have in future oil production in various states is ap-



DISTRIBUTION OF OIL RESERVES throughout the world has changed considerably since 1946. The Middle East, leading in 1946, has jumped way out in front and holds a commanding position on the basis of 1959 reserve estimates. Fig. 3.

parent from Table 1. Actually the economically recoverable reserves by gas and water-injection methods are greater than the primary reserves in New York, Pennsylvania, Indiana, Illinois, Michigan, Alabama, New Mexico, Colorado, and Utah and they are approximately equivalent to those in Oklahoma. It can be seen from this table that the proved recoverable oil reserves of the nation, as a result of the development and application of gas and water-injection methods, are in the range of some 45.8 billion barrels of crude oil (Column 5 plus Column 7 of Table 1) rather than some 31.7 billion barrels as estimated by others. This represents a very significant increase of 44.4%.

As was the case in previous reports, the estimated primary reserves are very close to the estimation by the API committee of the proved reserves. However, if the compact committee's primary reserves are added to its economically recoverable fluid injection reserves, the sum is considerably greater than the API proved reserves.

The fact that the findings of the two committees are not in agreement is not surprising, and is no cause for concern. The compact committee takes the optimistic view that the results that have been obtained in literally hundreds of fluid-injection operations are sufficiently dependable to be used as a criterion for the estimation of the possible additional recovery that can be obtained from the oil fields of the United States.

In a few cases certain state regulatory authorities believe that their respective primary reserves are higher than API estimations. This is a matter of opinion, and certainly need not be cause for contention for it is well known that the API reserves committee periodically has revised and increased its estimations of proved reserves as new fields have been discovered, or as deeper reservoirs have been found in older fields.

As new oil fields are found, the original oil content of the known reservoirs is increased. The compact committee estimates that this original oil content has amounted to the impressive figure of 328,407 million barrels (Column 1 of Table 1). No one can deny the abundance with which the United States has been supplied with liquid hydrocarbons.

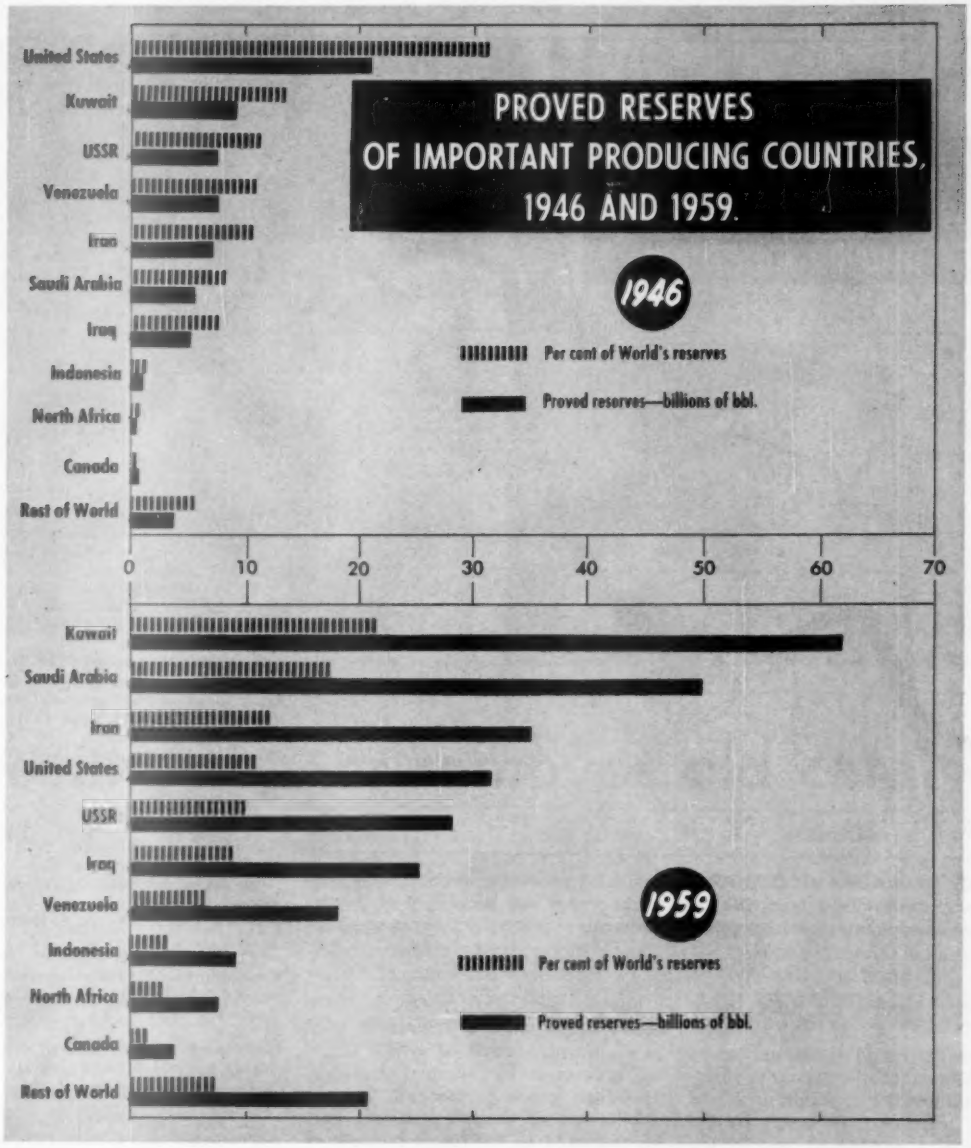
If the combined primary reserves (Column 5 of Table 1) and the reserves that will be obtained by conventional gas and water injection (Column 7 or Table 1) are added to the past production of the oil fields of the United States (Column 2 of Table 1), it will be seen that the known fields of the nation will produce eventually about 108.4 billion barrels of oil, which amounts to 33% of the original oil in place.

Although this percentage of recovery is much less than that obtained by certain other mineral industries, it represents a great improvement over the recovery that was obtained from oil fields only a few decades ago when an average recovery of only around 20% of the original oil in place could be expected. Such improvement is due in large measure to the adoption of conservation practices by most of the states and to the invention of new production methods.

Influence of water injection. Fig. 5 shows the rapid increase in the number of water injection projects in the past 10 years. The resulting increase in production rate as a direct consequence of these projects is also indicated. The influence of water injection on production capacity and recoverable reserves is obvious.

Further increases in oil production can be anticipated in 1960 and succeeding years as results begin to appear from large pressure-maintenance projects such as Wilmington field, California, Rangely field, Colorado, and others.

New recovery methods. The committee for the first time this year has considered the oil that is physically recoverable by improved recovery methods which have not been previously considered. Its preliminary estimation of the oil reserves that may be produced by solvents such as alcohols, the miscible-phase displacement and other forms of high-pressure gas injection, by the Orco process, and by thermal methods is given in Column 6 of Table 1. The compact committee was fortunate to have the benefit of information from leading

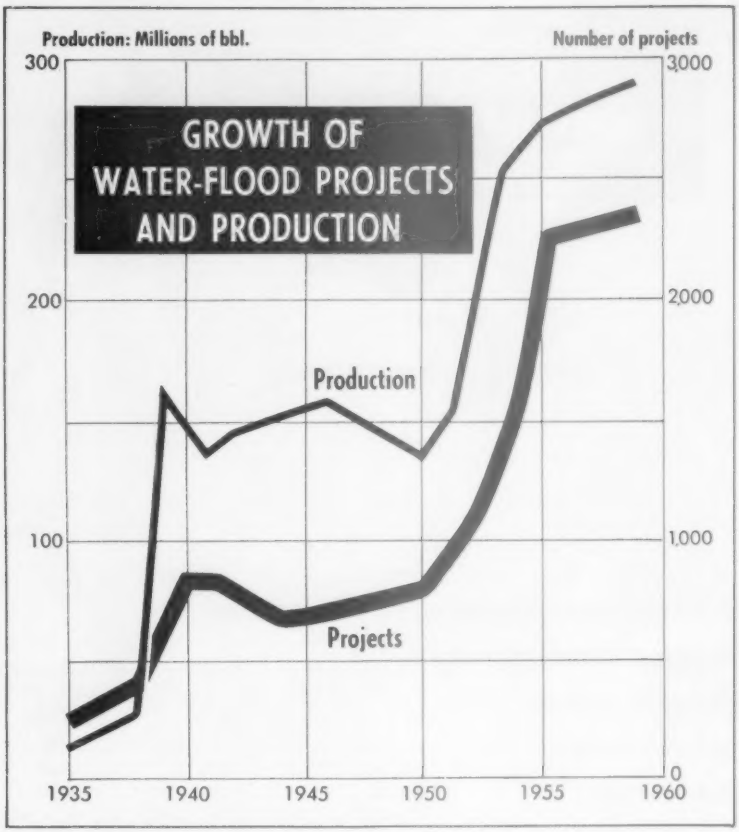


REALIGNMENT of important producing countries in the order of proved reserves since 1946 shows Kuwait in the lead with the United States in fourth position. This same data is included in Table 2, below. See also Fig. 3 for broad geographical distribution. Fig. 4.

TABLE 2—PROVED OIL RESERVES AND RANK OF THE MOST IMPORTANT COUNTRIES IN 1946 AND 1959

(Figures in billions of barrels)

Country—	1946 Proved reserves	1946 Rank	1946 % of world reserves	1959 Proved reserves	1959 Rank	1959 % of world reserves	Increase over 1946 (Bbl.)	Increase over 1946 %
United States	20.9	1	31.1	31.7	4	10.9	10.8	51.7
Kuwait	9.0	2	13.4	62.0	1	21.4	53.0	588.8
USSR	7.5	3	11.2	28.0	5	9.7	20.5	365.9
Venezuela	7.4	4	11.0	18.0	7	6.2	10.6	143.2
Iran	7.0	5	10.4	35.0	3	12.1	28.0	400.0
Saudi Arabia	5.4	6	8.1	50.0	2	17.2	44.6	825.9
Iraq	5.0	7	7.5	25.0	6	8.6	20.0	400.0
Indonesia	0.8	8	1.2	9.0	8	3.1	8.2	1,025.0
North Africa	0.2	9	0.3	7.3	9	2.5	7.1	3,550.0
Canada	0.2	10	0.3	3.5	10	1.2	3.3	1,650.0
Rest of World	3.7		5.5	20.6		7.1	16.9	563.3
Total	67.1		100.0	290.1		100.0	223.0	



INFLUENCE OF WATER-FLOOD RECOVERY on total production and reserve estimates can be visualized from this curve that shows the rapid growth in the number of projects and the accompanying increase in water-flood oil production. **Fig. 5.**

oil-recovery experts on these methods.[7 8 9 10 11 12]

The conclusion of these authorities is unanimous that under certain reservoir conditions the application of new recovery methods will result in the recovery of a substantial part of the total oil content, particularly in fields of fairly recent discovery.

In considering how these new methods may be employed the committee has recognized, just as it did in considering first the possible effects of conventional gas and water injection,[13] that future developments and studies will necessitate recalculations and revisions of its present findings.

The large reserve by new improved recovery methods estimated for Texas may be questioned. It has been developed by a review of most of the state's fields which possess at least one-half of their initial reservoir pressure. If this reserve of slightly over 16 billion barrels is added to past production and future recovery by primary and conventional secondary methods the possible ultimate recovery is still only a little over one-half of the original oil in place.

Large reserves of heavy, high-viscosity crude oil are known to exist in California, much of which might be recovered by thermal methods. However, it was pointed out that the application of thermal methods may be restricted in California because of the existence of laws prohibiting the pollution of the atmosphere.

Regardless of all of the geologic, legal, and economic problems that may affect the application of the new recovery methods to the oil fields of the United States, it is felt that the estimated recovery of some 44 billion barrels is actually a minimum figure. **Future recovery expectancy from existing United States oil fields, therefore, could be in the range of 90 billion barrels rather than around 45 billion barrels.**

Although figures from 1959 are not yet available, it is a reasonable supposition that about 3.5 billion barrels of the economically recoverable reserves by conventional methods of fluid injection exist in stripper - well fields; that is in fields where the cost of production equals or is approaching the value of the oil produced. Recent studies have shown that almost three-quarters of all of the oil wells in the United States are in the stripper or marginal classification.

References

1. Paul D. Torrey, "Evaluation of United States Oil Resources as of January 1, 1960": Oil and Gas Compact Bulletin, Vol. XVII, No. 1, June 1958, pp. 15-17.
2. API and AGA, "Proved Reserves of Crude Oil, Natural Gas Liquids and Natural Gas, Dec. 31, 1959," Vol. 14.
3. Oil Weekly, "1947 World Oil Atlas" Section 2, June 30, 1947, p. 35.
4. The Oil and Gas Journal, "World Wide Oil Report," Vol. 57, No. 53, Dec. 28, 1959.
5. E. G. Dahlgren, "Magnitude of Secondary Recovery Operations in the United States": API, "Secondary Recovery of Oil in the United States," second edition, Chapter 2, p. 34.
6. Albert E. Sweeney, Jr., "A Survey of Secondary Recovery Operations and Methods Employed in the United States": Presented at meeting of Illinois Oil & Gas Association, Mount Vernon, Ill., Apr. 11, 1957.
7. L. P. Whorton and T. J. Dorsey, "High Pressure Gas Injection": Interstate Oil Compact Quarterly Bulletin, Vol. IX, No. 1, May 1950, pp. 62-63.
8. James W. Martin, "The Use of Carbon Dioxide for Increasing the Recovery of Oil": Interstate Oil Compact Quarterly Bulletin, Vol. X, No. 1, April 1951, pp. 50-53.
9. Charles D. Russell, "Gas-Drive Recovery Using Solvents and LPG": Oil and Gas Compact Bulletin, Vol. XVI, No. 2, December 1957, p. 39.
10. T. W. Nelson and J. S. McNiel, Jr., "Oil Recovery by Thermal Methods": Oil and Gas Compact Bulletin, Vol. XVII, No. 2, December 1958, pp. 56-70.
11. Richard A. Morse, "Trends in Oil Recovery Methods": Oil and Gas Compact Bulletin, Vol. XVIV, No. 2, December 1959, p. 58.
12. R. L. Slobod, "Research on Methods for Improving Oil Recovery from Pennsylvania Oil Field": Oil and Gas Compact Bulletin, Vol. XVIV, No. 2, December 1959, p. 58.
13. Paul D. Torrey, "Oil Resources of the United States": Oil and Gas Compact Bulletin, Vol. XIV, No. 1, June 1955, pp. 48-50.
14. Hon. Warwick M. Downing, one of the founders of the Interstate Oil Compact Commission, official representative of the governor of Colorado, and chairman of the Colorado Oil and Gas Conservation Commission, personal communication.
15. Morgan J. Davis, "The Dynamics of Domestic Petroleum Resources": API Proceedings, Section 1 — General, 1958, pp. 22-27.

Bibliography

Morgan J. Davis, as reported in The Oil and Gas Journal, Vol. 57, No. 13, Mar. 23, 1959, p. 51.

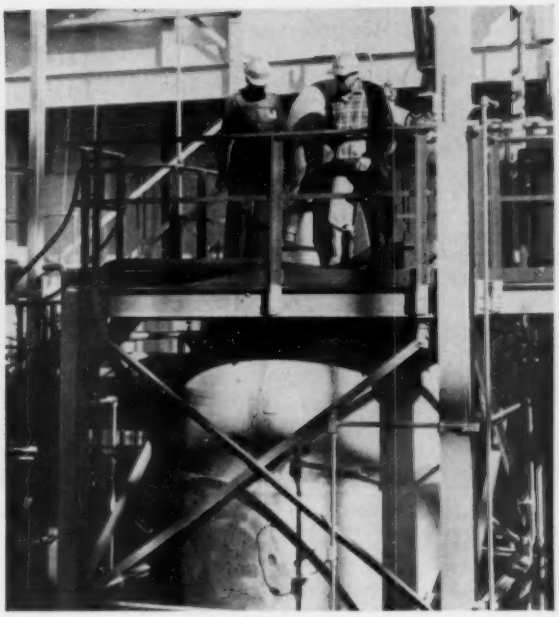
Ernest O. Thompson, "Domestic Reserves and the Need for an Excess Producing Capacity for National Security": API Proceedings, Section IV — Production, 1957, pp. 12-15.

Case No. 338, Order No. 371, Industrial Commission of the State of North Dakota, Jan. 25, 1960.

General Counsel Report, Interstate Oil Compact Commission, No. 22, Mar. 22, 1960.

Bruce C. Netschert, "The Future Supply of Oil and Gas": published for Resources for the Future, Inc., by the Johns Hopkins Press, Baltimore 18, Md., 1958.

FLEXIBLE HOSE which is connected to side of vessel is used to remove 1-in. clay spheres and contaminated catalyst from top of reactors. Fig. 1.



VACUUM of 28-in. Hg is sufficient to raise the heavy silica-alumina spheres 28 ft. Fig. 3.

Vacuum cleaner removes old catalyst

HERE'S AN IDEA which may help you. Use a giant vacuum cleaner to remove clay and catalyst from reactors. That's what they're doing on the catalytic reformer at Ohio Oil Co.'s Robinson, Ill., refinery.

A two-stage vacuum jet and a nearby 3-in. evacuation line are used to get the necessary suction. The storage drum is a cylindrical vessel dug out of the refinery scrap heap.

Fig. 1 shows the vacuum in action. Fig. 2 is a cross-section of the apparatus. The vacuum jet and evacuation line are connected to the top of the drum, while a 3-in. flexible hose is connected to the side. A slide valve is installed in the bottom of the vessel to permit simple and quick removal of the catalyst.

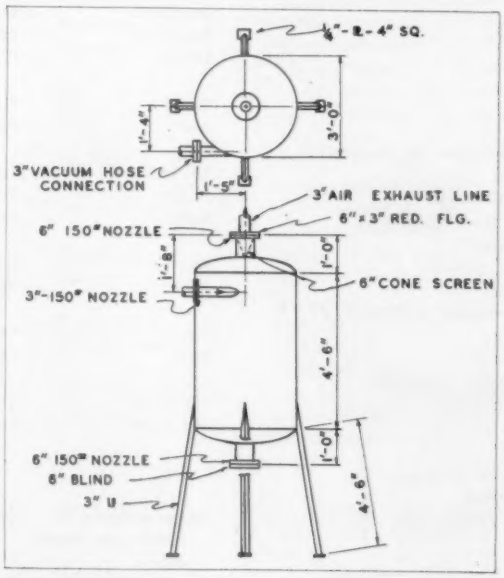
Operation. As soon as the reactors are opened following the catalyst regeneration cycle, the flexible hose is lowered into the reactor to pick up contaminated catalyst and supporting silica-alumina spheres. A fine-mesh screen at the top of the storage vessel keeps small particles from entering the evacuating line.

When the drum is filled to a predesignated height, a valve is closed on the vacuum line to seal off the vessel. The material is then unloaded into 55-gal. drums through the slide valve in the bottom.

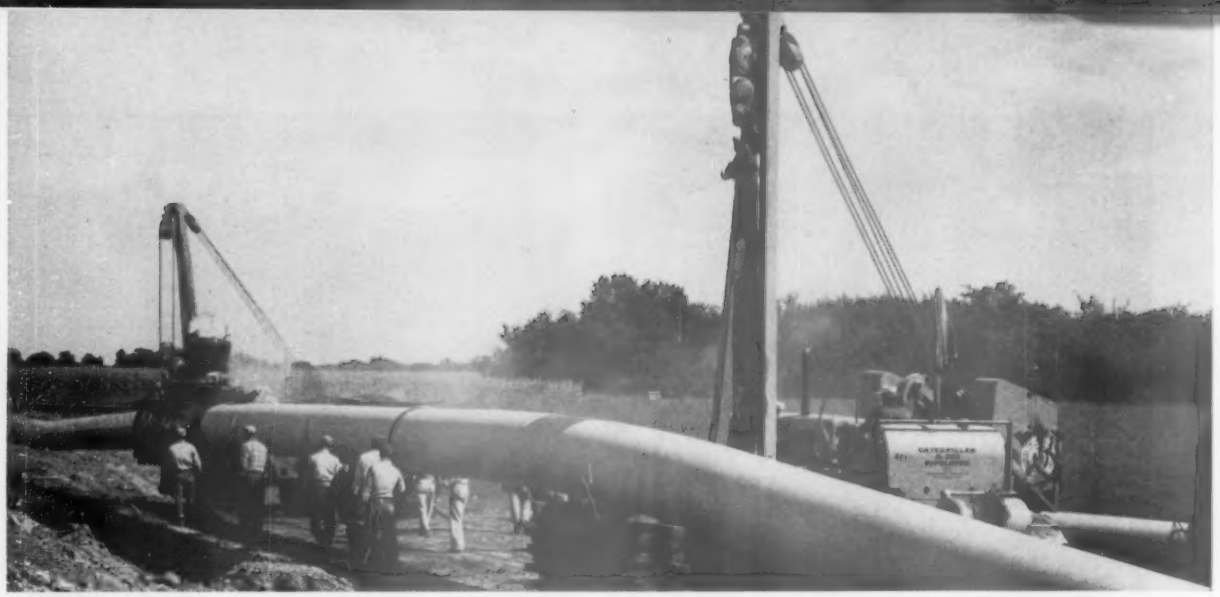
An ordinary industrial vacuum cleaner was tried first, but it didn't provide enough suction. This apparatus does—about 28 in. Hg, and is sufficient to raise the heavy silica-alumina spheres 28 ft.

Four or five 55-gal. drums of material can be withdrawn from a reactor in less than an hour. The job could be done even faster, but the cost of catalyst dictates that care be used to avoid picking up pure catalyst.

The new method saves about 90% of the time used when entering the reactor and removing material bucket by bucket. In addition, a better job is done with less waste and, most important, it is much safer since it is no longer necessary to enter the vessels.



CROSS-SECTION drawing shows construction details. Fig. 2.



"HOT-APPLIED COATINGS are the reference point in evaluating all of the new coatings . . . and to date none of the new coatings has consistently outperformed these standards."

Table 1—Evaluation of

	Coal tar hot applied coatings	Hot applied asphalts	Polyvinyl tapes	Polyethylene tapes
Application—Ease	Fair	Fair	Very easy	Very easy
Location	Field or mill	Field or mill	Field	Field
Primer needed	Yes	Yes	Desirable	Desirable
Hot or cold applied	Hot	Hot	Cold	Cold
To heated pipe	No	No	No	No
Tendency to pinhole	Very little	Very little	Very little	Very little
Coating thickness	62-100 mils	62-125 mils	10-20 mils	10-20 mils
Set or cure time	Cooling only	Cooling only	Immediately	Immediately
Adhesion				
Psi.—start	150	150	4-5	8-10
	Breaks in ctg.	Breaks in ctg.	Breaks at metal	Breaks at metal
2 years in service with cathodic prot. . .	Excellent	Poor	Fair	Fair
Chemical resistance				
Soil chemicals	Excellent	Excellent	Excellent	Excellent
Salt water	Excellent	Excellent	Excellent	Excellent
Ground water	Excellent	Excellent	Excellent	Excellent
Petroleum	Good	Poor	Adhesive loosens	Adhesive loosens
Flexibility				
77° F.	Good	Good	Good	Good
40° F.	Fair	Fair	Good	Good
Highest temperature for continuous Service	To 160° F.	To 160° F.	To 140° F.	To 170° F.
Soil stress resistance	Poor	Poor	Fair	Fair
With protective wrapper	Fair	Fair	Good	Good
Impact resistance				
Ball or flat surface	Fair	Fair	Fair	Fair
Sharp edges	Poor	Poor	Poor	Poor
Continuous pressure resistance, 77° F.				
Coating only	Poor	Poor	Fair	Fair
With wrapper	Fair	Fair	Good	Good
Effect of cathodic protection				
1.0 volt maximum	No effect	Losses bond	No effect	No effect
More than 1.0 volt	No effect	Losses bond	Blisters	Blisters
Effect of pushing				
Pipe under roads, tight drill holes	Some scraping of coating on sharp stones	Some scraping of coating on sharp stones	Coating slides off—cuts	Coating slides off—cuts
Coating of pipe joints	Hot coatings	Hot coatings	Tapes	Tapes
Effectiveness	Excellent	Excellent	Fair	Fair

What's happening to hot-applied coatings?

• Few topics in pipelining have been discussed more than have protective coatings since new materials began to force their way into the picture. This provocative article presents the controversy from the point of view of an expert long associated with hot-applied coal-tar coatings.

BY N. T. SHIDELER
Coatings Consultant, Pittsburgh

New and Old Coatings

Coal tar pitch-epoxy resin coatings	X-Tru-Coat	Powdered epoxy Skotchkote 101	(Est. values) butoxy coating
Difficult	Already coated	Not difficult	Not difficult
Mill or hd. app. field	Steel mill app.	Mill application	Mill application
No	No	No	No
Cold to hot pipe	App. by st. mills	Cold to hot pipe	Cold to hot pipe
Cold or heated	Hot in mill	Yes	Cold or heated
Several	Very little	Several	Very severe
15-25 mils	25-45 mils	10-12 mils	3-5 mils
10 min.-24 hr.	cooled with water	Cooled on racks 20 min.	Cooled on racks 20 min.
1,000	8-20	1,000	1,000
Breaks in ctg.	Breaks in adhesive	Breaks in ctg.	Breaks in ctg.
Fair to good	Fair to good	Excellent	Est. good
Excellent	Excellent	Excellent	Excellent
Excellent	Excellent	Excellent	Excellent
Excellent	Excellent	Excellent	Excellent
Excellent	Adhesive softens	Excellent	Excellent
Good	Good	Fair	Fair
Fair	Good	Poor	Poor
To 250° F.	To 200° F.	To 300° F.	To 300° F.
Excellent	Good	Excellent	Excellent
Not needed	Good	Not needed	Not needed
Excellent	Fair	Excellent	Excellent
Good	Poor	Good	Good
Excellent	Fair	Excellent	Excellent
Not needed	Good	Not needed	Not needed
No effect	No effect	No effect	No effect
Depends on formulation and application	Undercutting at holes, blisters	No effect	No effect
No effect	Ctg. moves and cuts on sharp edges	No effect	No effect
New tape and ctg.	Tapes	Tapes	Tapes
Good	Fair	Fair	Fair

THE CONFUSION existing in the pipeline-coatings industry has many of the younger and some of the experienced pipeline personnel asking: What has happened to the hot-applied coatings used as standard coatings to protect underground pipelines for so many years?

It is little wonder that this question should be asked. During the past 5 years, other than advertising, little has been said about the hot-applied coatings. Meanwhile oil and gas-transmission and utility personnel have been flooded with literature and data on the merits and application of one new coating or another. Trade magazines have carried many articles about the new coatings and their use. Salesmen and technical sales engineers for the new coatings have been very active contacting pipeline company personnel giving data and asking for test applications. Everyone is interested in something new; hence the new coatings have attracted wide interest.

Actually the tonnage of hot-applied coatings used on pipelines in 1959 was only slightly less than the 350,000 tons per year used in the peak years of 1952 and 1953. Reports from the major mill applicators indicate that their tonnage of hot-applied coatings used and footage of pipe coated in 1959 was up about 25% over that of 1957 and 1958; 1960 also looks very good.

A look at the facts and the trends indicates that hot-applied coatings will continue to be the main line of defense against corrosion of underground pipelines for at least 10 years or possibly longer. The period will have to be long enough to permit further development in formulation, improvement in application methods and development of some reasonable performance data and life expectancy of the new coatings.

All of the new coatings developed or introduced on the market since 1945 have been radically changed since they were first offered to the trade, and since only the basic types have moderate term service underground prior to the changes, each is as young as the time of the last change made in their structure, composition, or system. Thus almost none of them can be considered to be more than about 2 or 3 years old. All of the new coatings have serious drawbacks in one area or another, and these must be corrected before performance and life of the new coatings can be determined.

Cause of Confusion

There are at least five major factors that have contributed to the confusion.

1. Between 1951 and 1955 the gas-transmission companies realized that

increasing pressures in their lines, the resulting high temperatures of the pipelines for several miles on the discharge side of the pumping stations, the larger-diameter pipe with its greater weight per foot of pipe, and the inflationary costs of installation of long, large-diameter pipelines made their problem of protecting these structures from corrosion of utmost importance.

In many cases their purchase of the cheapest type of the hot-applied coal-tar enamel was actually the most costly in the long run. Also some areas on the new pipelines will operate in the future at temperatures too high even for the most temperature-resistant hot-applied coating.

2. The gas-utility distribution people are not bothered with high temperatures but with rapid expansion of their distribution systems in congested industrial and urban areas where it is possible only to lay a few hundred feet of pipe at a time. Coated or protected pipe has become a necessity, and in many places this pipe must be pushed under driveways, under streets, and in general receive rough handling.

The indifference of the labor used in installation work also contributes to the problem of getting the pipe installed with a minimum amount of damage to the protective coatings. Here also, high cost of installation makes long life and maximum protection of the pipe of prime importance.

3. The complacency of the established and well-recognized pipeline-coating manufacturers has done much through the years to create an opening for new coatings. From about 1900 to 1950 only one major change was made in the hot-applied coal-tar coatings. Since 1950 two changes were introduced to make the coatings more nearly fit the requirements of the pipeline industry. However, had this work of developing coatings to anticipate the needs of the industry started in 1940 rather than in 1948, there probably would not have been the confusion that now exists in the coatings industry.

4. The market for paints and coatings for general and industrial use produced largely by the paint manufacturers is a large-volume business, but it is also a very competitive and a low-profit business. On the other hand, the pipeline protective-coating business has been on a tonnage basis, large volume, and the field supplied by a very limited number of manufacturers selling direct to the users.

There are no jobbers or retailers as in the paint market; thus the pipeline market is very attractive. This coupled with the open-mindedness of the pipeline people, their willingness to try

Table 2—Favorable and Unfavorable

Hot-Applied Coal-Tar Coatings

FAVORABLE	UNFAVORABLE
1. Excellent adhesion for life of coating.	1. Requires primer and use of heavy equipment for over the ditch coating.
2. Adhesion strength—150-psi. coating breaks before adhesion to metal.	2. High temperature of application.
3. Low moisture absorption through 40 years of service.	3. Usually requires wrappers (coal tar saturated felt) to improve soil stress, puncture and cold flow characteristics at elevated temperatures.
4. High electrical resistance throughout long life if undamaged.	4. Subject to soil stress and puncture by clods, stones and debris in backfill.
5. Not affected by overvoltage or high current density with cathodic protection.	5. Requires care in handling and bending to prevent mechanical damage.
6. Resistant to all soil or marine chemicals such as salts, acids, alkalities, petroleum, and petroleum products.	6. Highest temperature range coatings quite soft at high pipeline temperatures.
7. May be pushed or pulled under driveways, streets, and other underground structures without serious damage to coating.	7. Not effective in sea water against barnacles.
	8. Lacks high-temperature resistance for gas transmission.

Hot-Applied Asphalt Coatings— (not including mastics and waxes)

1. Excellent initial adhesion — 150-psi. breaking strength—breaks in coating rather than bond to metal.	1. Needs primer and heavy equipment for over-the-ditch coating.
2. Fumes from hot application not objectionable.	2. Generally requires asphalt-saturated bonded felt wrapper for greater resistance to soil stress and puncture.
3. Slightly better noncold flow characteristics than wide-range coal tars.	3. Requires care in handling to prevent mechanical damage.
4. Resistant to all soil acids, alkalies, and chemicals.	4. Coatings quite soft at higher operating temperatures.
5. May be pushed or pulled under crossings, driveways, etc., without serious damage.	5. Indication that bond to pipe is loosened by cathodic protection.
	6. Not effective in sea water against cutting by barnacles.
	7. Coating dissolves in petroleum saturated soils.
	8. Lacks high-temperature resistance for gas transmission.

Pressure-Sensitive Tapes

1. High electrical resistance.	1. Indicated lowering of resistivity in service.
2. Ease of application in field to pipe and welded joints.	2. Some indication of blistering under cathodic protection if voltage is above 1 volt.
3. Minimum heavy equipment needed for application and installation.	3. Poor bond, 4 to 10-psi. adhesion of tape to adhesive and adhesive to pipe.

Performance Characteristics of Coating Systems

Pressure-Sensitive Tapes (Continued)

FAVORABLE	UNFAVORABLE
4. Indicated low-water absorption.	4. Need for wrappers to resist puncture, impact and soil stress.
5. Highly resistant to soil acids, alkalies and normal corrosive soil conditions.	5. Difficult to push or pull coated pipe under roads, drives, and underground structures without moving coating.
	6. Void at tape lap permits moisture entrance and rust on pipe, joints and fittings. These areas cannot be cathodically protected.
	7. Adhesive loosens when in petroleum saturated soils.
	8. Cannot stand high temperatures developing in gas-transmission lines.

Extruded Polyethylene Coating

1. Coating applied at pipe mill.	1. Indication of considerable shrinkage back from cutback at end of pipe.
2. High initial electrical resistance.	2. Some indication of cracking of coating in storage.
3. Tough, strong coating not affected by soil stress.	3. Some reports of water solubility and absorption by adhesive.
4. Requires only moderate care in handling and installation.	4. Some reports of shrinkage after installation, giving voids at joints.
5. Joints easily wrapped with pressure sensitive tapes.	5. Taped joints have same difficulties reported for tapes.
6. Good at temperatures up to 170° F.	6. Adhesive dissolves in petroleum saturated soils.
	7. Rather easily punctured.
	8. Cannot stand high temperatures developing in gas-transmission lines.

Coal Tar-Epoxy Resin Coatings

1. High initial electrical resistance.	1. Usually requires mill application to heated pipe for fast curing; difficult to apply.
2. Excellent adhesion, 1,000-psi. break occurs in coating not adhesion to metal.	2. Two-component system, difficult to mix and with short pot life in hot weather.
3. Not easily damaged on installation or handling.	3. Slow curing at cool temperatures.
4. Completely resistant to soil stress and puncture.	4. Coating should not become wet with water while taking initial set.
5. Hard yet flexible up to 250° F.	5. Somewhat difficult to apply in uniform thickness to pipe.
6. Low moisture absorption.	
7. Not affected by cathodic protection.	
8. High resistance to all soil chemicals and petroleum products.	
9. No wrappers needed.	
10. Not damaged by barnacles, excellent in sea water.	

Note: Not enough data to include Skotchkote 101 and butoxy in this article.

new coatings in recent years, and the rapid development of new thermalplastic and thermalsetting resins has thrown the field wide open to everyone.

5. Data published on the newer coatings and their trial applications are largely laboratory data and from a few scattered performance tests performed by the manufacturer. Corrosion engineers with the pipeline companies are either reticent or prevented from publishing the true data they obtain from trial applications of new coatings to pipelines; thus the picture may be distorted.

The hot-applied coal-tar coatings started at the beginning of the century with practically one type of coating consisting of straight coal-tar pitch and mineral pigment or filler. This type is generally known as the "narrow-range" enamel because of its brittleness at normal temperatures, its tendency to crack at temperatures much below 30° F., or flow from the pipe surface at much above 120° F.

The first radical change in the type of coal-tar enamels came between 1930 to 1932 with the development of the "coal digestion pitches" and the production of the "wide-range" enamels having a use temperature range of −20° to 160° F. No further changes were made until the end of 1949 with the introduction of the "moderate-range" enamel having a useful temperature range of 0° to 140° F.

The last improvement came in 1953 with the introduction of the "wide-range" enamel modification generally known as the "hot pipe-line" enamel with a temperature range of 0° to 180° F.

The highest really safe continuous temperature for use of even the hot pipeline enamel is 160°F. Today many pipelines for a distance of 15 miles out from the discharge side of the pumping stations may be 180° to 160° F. At these temperatures the coating is fairly soft, cannot stand too much pressure by objects in the trench backfill or from the weight of the pipe without some displacement. The use of tar-saturated felt outerwrap greatly improves the strength of the coatings both to pressures and to soil stresses.

Even at these high temperatures, the hot-applied coatings are performing remarkably well and can stand normal cathodic protection without losing bond or blistering. In the utility pipeline field they can and do perform exceptionally well. Perhaps their principal drawback is that hot-enamel coating on pipe does not have a high impact resistance, and may be damaged in the rough handling that occurs in some areas.

Regardless of the interest in the new

coatings and the possibility that they may in the future replace the hot-applied coatings, the hot-applied coatings are the reference point in evaluating all of the new coatings as they are introduced on the market, and to date none of the new coatings has consistently out-performed these standards.

The New Coatings

The first of the new coatings on the market were the pressure-sensitive tapes, polyvinyls, followed quickly by the polyethylene tapes. Their progress in the pipeline-coatings field has not been rapid, and the changes have been many, both in the types of adhesive to permit adhesion to the metal and in the basic formulation of the tapes themselves. There have been many failures and some successes. Most success has been obtained when the tapes are used over special primers designed for use with the tapes. Although the tapes were being tested in the late forties, they were not seriously considered until about 1952. Some changes and improvements have been made since that time.

The coal tar pitch-epoxy resin two-component coating first became known about the middle of 1953. These coatings created considerable excitement in the industry, and several thousand feet of pipe has been coated and is underground. In spite of the large number of manufacturers and much talk, these coatings cannot be too much of a threat until a suitable application method is developed. The application may be forthcoming this year.

A third coating introduced about the same time as the coal tar pitch-epoxy resin coatings is that known as X-Tru-Coat applied by Republic Steel Co. to small-diameter pipe at the pipe mill. The coating is a special high-molecular-weight polyethylene extruded over a rubber-based compound on the pipe which acts as the adhesive to hold the polyethylene on the pipe. This coated pipe has gained considerable interest in the gas-distribution field.

A fourth coating is just being introduced this year. It is an epoxy resin with a complex catalyst and pigment and is supplied as a single component system in powdered form. It is manufactured by Minnesota Mining & Manufacturing Co. and known as Skotchkote 101. The coating is applied to preheated pipe. The heat flows out the coating and triggers the catalytic or hardening action. This coating is in the experimental application stage at present but will be underground before the end of the year.

Little is known about a fifth new coating, not yet on the market, based on the butoxy resins manufactured by Enjay Co., Inc., of Elizabeth, N. J. This coating will be applied as a liquid to the pipe, probably by spray and is cured by a ring burner maintaining a temperature of about 500° F. on the coated pipe surface for a few seconds. It is understood that one coating manufacturer is working on this coating, and it may be available on pipe sometime this year.

Characteristics of Old and New Coatings

Table 1 gives the general characteristics of the old and the new coatings in more or less general terms. The terms are general to avoid excessive claims that may be misleading. Electrical resistance, water absorption, and some of the other factors are purposely omitted. Almost everyone will concede that practically all of the coatings have ample electrical resistance and, in fact, high dielectric strength as measured in the laboratory. Even in the field the resistance is high enough.

Water absorption of all of the coatings is low except possibly that of the hot-applied asphalts. Even their occasional failure is more probably due to loss of bond than to water absorption because it does not rise high enough to reach the pipe surface in normal periods of time. Many people may take exception to some of the evaluations in Table 3; however, such exception merely points out the confusion that exists.

Table 2 gives some of the pros and cons of the various coating systems. The Skotchkote 101 and the butoxy resin coatings are omitted from this table because of the lack of data or experience with these coatings.

One specific point stands out in considering all of the newer coatings. They are all relatively thin-film coatings. The average thickness of the hot-applied coatings is 3/32-in. or 93 mils. This thickness is great enough to cover up dust, dirt, and foreign materials that get into coatings applied in the field and in the mill. The thickness of the new coatings, except the X-Tru-Coat, is less than 25 mils. Even very small particles of dust, sand from sandblasting, or steel grit from wheelabrator cleaning make voids in the new coatings.

This means that if the new thin coatings become standard coatings for pipelines, either extreme cleanliness in the mill applicating must be observed or the pipeline people will have to change their ideas with regard to minute holes in the coating. Also with the newer coatings the testing of the coatings with high-voltage spark detectors should be eliminated; otherwise the mills will not be able to apply the new coatings economically.

If the corrosion engineer considers how many pinholes of even 10 mils diameter are required to equal 1 sq. in. of bare pipe and the amount of cathodic protection needed to protect the pinholes, there is no reason to fear them. The pinholes are not dangerous unless the coating permits the hydrogen to form large blisters and undercut the coating. This does not happen with the coal tar pitch-epoxy resin coatings or the powdered epoxy applied to heated pipe.

The tapes are also very thin and must be very stable and well bonded to the pipe to last the expected life of the pipeline. It is doubtful that as light a bond as is exhibited by the tapes and the extruded polyethylene can last as long as is expected. Transmission pipe on the discharge side of the pumping stations is already at a constant temperature of 160° F. on many lines and future temperatures will be higher. These temperatures are already past the limit for many old and new coatings.

What Does It All Mean?

There is no question but that the hot-applied coating will be replaced by synthetic or partially synthetic coatings within a few years. There is one further step that can be made in the improvement of the hot applied coatings system which may occur this year. This may give them added life.

There is also the possibility that someone may develop a combined coal-tar pitch and synthetic-resin coating that may be applied 1/16 to 3/32-in. thick that will harden slowly that may overcome the accumulating problems for the hot-applied coatings.

References

1. NACE Technical Unit Committee T-2H on Asphalt Type Coatings, "Asphalt-Type Protective Coatings For Underground Pipe Lines—Wrapped Systems." Corrosion, Vol. 13, p. 75, Apr. 1957.
2. NACE Technical Unit Committee T-2H on Asphalt Type Coatings, "Asphalt-Type Protective Coatings For Underground Pipe Lines." Corrosion, Vol. 14, p. 37, Aug. 1958.
3. Dabney, M. J., Slotterbeck, O. C., and Koenecke, D. F., "Synthetic Pipeline Coatings Promising," The Oil and Gas Journal, June 8, 1959, p. 160.

Buck, Frank, "Tape Coating for Distribution Piping," Gas Age, May 1956.

4. Shideler, N. T., "Pipe Line Coatings—Present and Future," AGA Distribution Conference, Cincinnati, Apr. 1959.
5. Cates, Walter H., "Coatings for Steel Water Pipe," American Water Works Journal, Vol. 45, No. 2, Feb. 1953.
6. Allen, E. R. Jr., "A Coating Evaluation Testing Program," Corrosion, Vol. 14, No. 12, p. 546t-552t, Dec. 1958.
7. Shideler, N. T., "Pipeline Coatings—Present and Future," Gas Age, May 14, 1959.

Suspension bridge for huge pipeline designed for safety with USS Tiger Brand Wire Rope

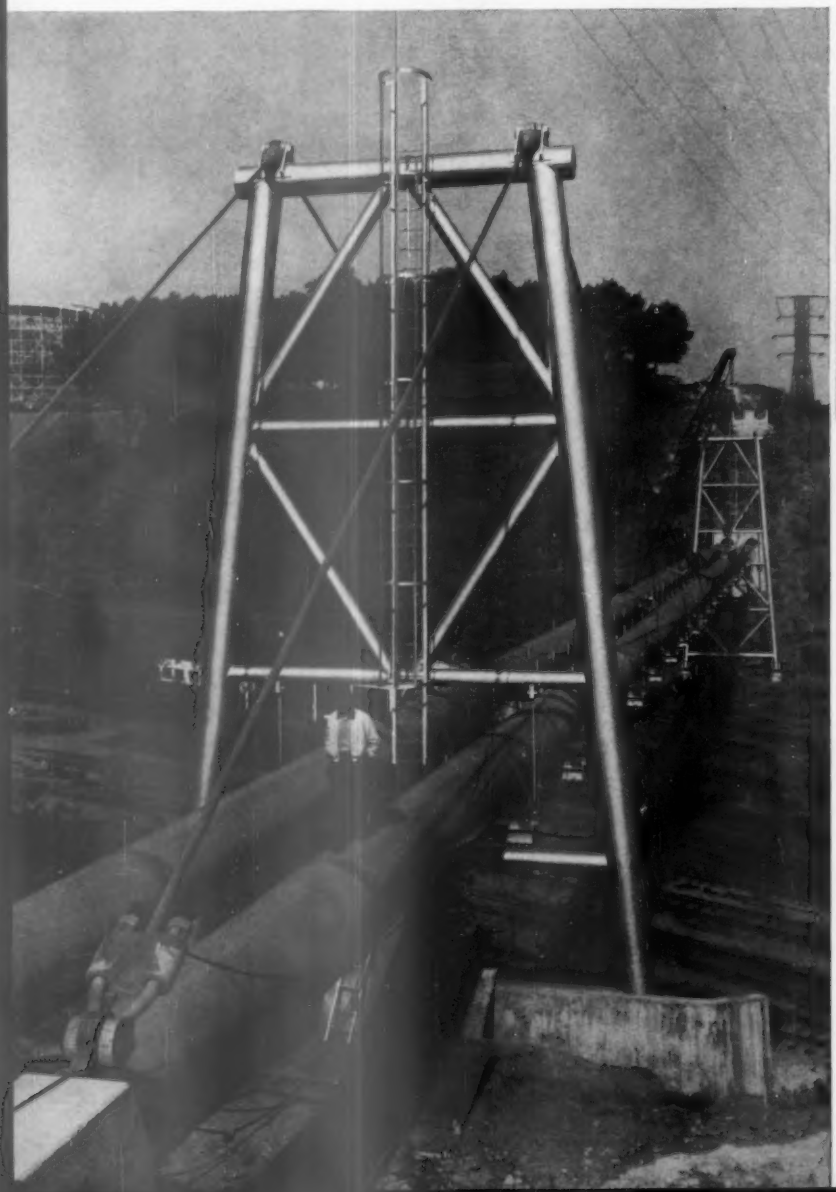
Carnegie Natural Gas Company reports that this is the largest pipeline for gas transmission ever carried over a suspension bridge. It consists of twin parallel pipes each having a 54.5-inch inside diameter for 7.9 miles. The remainder of the pipe is 42.5-inches I.D. for 4.3 miles. The pipeline originates at the Clairton, Pa. Coke Works of United States Steel and terminates at the Homestead Steel Works.

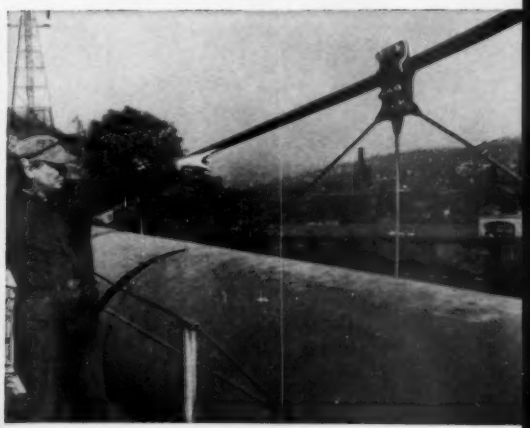
The main span of the bridge uses two USS Tiger Brand Galvanized Bridge Strands each 2¾ inches in diameter, 367 feet long and composed of 175 wires. The vertical and diagonal supports are made from ⅝-inch diameter 6 x 7 extra galvanized bridge rope with strand core. The pipe is anchored to steel beams with ½-inch diameter 7-wire galvanized Amerstrand with a clevis-type swedge fitting on one end and a threaded-type swedge fitting on the opposite end.

In addition to the bridge strand ropes used for the bridge, all wire rope used on the pipe laying equipment was also Tiger Brand. For information about any type of wire rope, strand or slings write Dept. 0202, American Steel & Wire Division, 614 Superior Ave., N.W., Cleveland 13, Ohio.

USS, Tiger Brand and Amerstrand are registered trademarks

Pipeline suspension bridge built with **USS Tiger Brand ropes and strand for utmost safety.**
Owner: Carnegie Natural Gas Company, Pittsburgh. Engineers: Williams Bros. Company, Tulsa, Okla. Contractor: American Bridge Division





Why USS Tiger Brand is your best buy

Tiger Brand Wire Rope is designed by the country's leading wire rope engineers. It's made and researched with the most complete facilities in existence. When you buy Tiger Brand you get the right rope for the job. And your installation is no further away than a phone call to experienced American Steel & Wire field service representatives or your USS Tiger Brand Distributor.

American Steel & Wire Division of United States Steel

USS

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors
United States Steel Export Company, Distributors Abroad

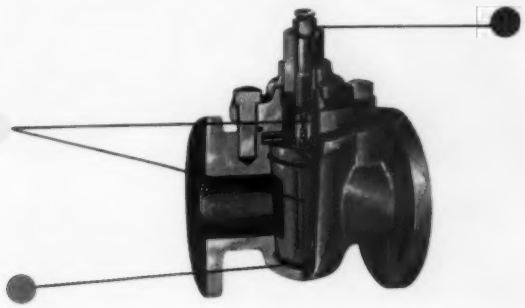
The Chinese had water distribution systems centuries ago. "Pipes" were sections of bamboo continuously spouting water. While date or inventor is not certain, one of the earliest valves was made by boring a hole in a plug and fitting it into holes cut in the bamboo pipe.

he stopped a trickle of water

. . . and his idea helped give you a better valve

One of the first known valves, a plug cock invented by the Chinese, had two inherent advantages never equalled by any other type of valve: *simplicity in construction and operation.* It controlled flow with only one moving part, the rotary plug.

To these basic advantages, the modern Rockwell-Nordstrom valve adds a third: *pressurized lubrication.* Pressurized lubrication totally seals the valve against leakage and maintains an instantly renewable seat. It also reduces wear and assures easy operation. And because there are only three basic parts – plug, body, and cover – you get longer life and lower cost—"The fewer the parts, the fewer the repairs." For more advantages of the Rockwell-Nordstrom valve, see the illustration below.



RUGGED DESIGN PLUS LUBRICATION SAVES MONEY

- Lubricant quickly, easily injected through Rockwell fitting.
- Lubricant travels through Sealdport® system to create powerful seals against leakage and prevent metal-to-metal wear between plug and body . . . note seats never exposed to the line.
- Lubricant hydraulically jacks plug minutely from seat for instant quarter-turn operation.

Rockwell-Nordstrom is the original and world's most complete line of lubricated plug valves. Available in sizes from ½" to 36" and pressures to 15,000 lb. For additional information, see your supplier or write: Rockwell Manufacturing Company, Pittsburgh 8, Pennsylvania. Canadian Valve Licensee: Peacock Brothers Limited. If you live outside the USA, write: Rockwell International S.A., Geneva, Switzerland.

Lubrication Makes The Difference

ROCKWELL-Nordstrom VALVES

another fine product by

ROCKWELL

Progress Report on Source Water Pumps for Secondary Recovery from

PEERLESS PUMPS

For Source Water. The Peerless Vertical Line shaft pump is adaptable to all type drives. In addition to the right angle gear drive pictured above, the pump may be ordered with a vertical hollow-shaft electric motor.

NOW GET UP TO 15,000 BPD FROM DEPTHS TO 1,500 FEET WITH PEERLESS VERTICAL LINE SHAFT PUMPS

Whether your source water is 150 feet or 1,500 feet deep, the Peerless vertical line shaft pump is the ideal pump for a steady dependable flood water supply. That's because it is big enough to do the job—up to 15,000 BPD from well depths to 1,500 feet; it is flexible enough to fit any water flood project; and it has been proved on the job over periods of up to five years of continuous flood water supply service.

Moreover, Peerless vertical line shaft pumps are specially built for the rigorous duty of handling corrosive fluids encountered in flooding operations. For example, the water lubricated type most frequently used for this service has special shaft bearings that are most resistant to the damages of abrasives and corrosives in the fluids being pumped.

And Peerless offers you a number of different models permitting the vertical line shaft pump to be tailored to your area and water flood conditions. An informative bulletin on these pumps is available to you upon request.

Write today and request your copy of Bulletin B-102.

For Injection Service. Peerless Hydro-Line pumps have capacities up to 175,000 BPD and pressures up to 1000 psi. Pumps are well suited to handle corrosive liquids, and by adding or removing stages pressure can be varied without loss of efficiency.

Putting Ideas to Work

fmc FOOD MACHINERY AND CHEMICAL CORPORATION

Peerless Pump

HYDRODYNAMICS DIVISION

Offices:

New York; Detroit; Cleveland; Chicago; Indianapolis; St. Louis; San Francisco; Atlanta; Plainview; Lubbock; Phoenix; Albuquerque; Los Angeles; Fresno.

Distributors in principal cities. Consult your telephone directory.

Peerless Pump, Hydrodynamics Division, Food Machinery & Chem. Corp.
301 West Avenue 26, Los Angeles 31, California

Send me Bulletin B-1608 ☐ Have a field engineer contact me ☐

Company_____

Name_____ TITLE

Address_____

City_____ State_____

Location (all in Louisiana)	Date of Installation	Nominal Capacity MMCF per Day	Desiccant Volume Pounds	Cycling Time Minutes	Condensate Recovered to Jan. 1, 1960 Barrels	Gas Processed to Jan. 1, 1960 MMCF	Average Recovery Barrels per MMCF	Average Content Isopentanes and Heavier Barrels per MMCF	Recovery Efficiency Percent	Recovery Factor, Barrels per 1,000 Pounds Desiccant Exposed
Black Bayou Field, Cameron Parish	Dec. 1957	5	800	56	4,880	2,900	1.68	8.0	21	0.65
Chalkley Field, Cameron Parish	May 1958	15	6,000	43	17,290	7,510	2.30	4.5	51	0.30
Loisel Field, Iberia Parish	April 1959	12	4,660	45	3,540	2,140	1.65	2.7	61	0.17
East Cameron Blk. 17 Field (onshore), Cameron Parish	Oct. 1959	24	13,500	30	3,000	1,000	3.00	3.7	81	0.22
South Houma Field, Terrebonne Parish	Dec. 1959	14	6,400	40			2.93*	3.5	84	0.37
North Turtle Bayou Field, Terrebonne Parish	Dec. 1959	14	8,000	30			3.64*	4.1	89	0.27
Lake Washington Field, Plaquemines Parish	On order	12	8,800	30			3.42*	4.9	70	0.19
*Manufacturers' guaranteed data										

RECOVERY EFFICIENCIES and factors differ at each of Shell's Louisiana hydrocarbon-recovery plants.

Shell devised the above system of "recovery factors" to check practical results of . . .

Buying and operating short-cycle units

IN 1957, Shell Oil Co. installed its first short-cycle solid-desiccant hydrocarbon-recovery unit and since that time has installed units of various types ranging in capacity from 5 to 24 M.M.c.f.d. at a number of fields in Louisiana. Installed costs for these units ranged from $30,000 to $140,000.

This experience indicates that short-cycle adsorption units provide a dependable method for dehydration and recovery of hydrocarbons from high-pressure gas streams. Application, however, should in general be limited to small, lean-gas streams. Attractive payouts can be realized with these units if properly applied and operated. Most operating difficulties have been of a mechanical nature and have been solved by modifying the equipment.

Application. Economic application of the hydrocarbon-recovery unit is generally limited to gas streams that have:

1. Pressures of about 600 to 1,200 psi.
2. Liquefiable contents of less than about 5 bbl. of isopentanes and heavier, per million cubic feet of gas after primary separation.
3. Flow rates of less than 75 M.M.c.f.d. of gas.

Capital investment for units increases as the content of the recoverable fractions in the gas increases. In streams containing 5 bbl. per M.M.c.f. of gas or more, it may prove more economical to use low-temperature separation. Because of lower operating costs, operation of the hydrocarbon-recovery unit is more economical at small volumes than an oil-absorption plant. Such plants should be considered, however, when throughput exceeds 50 M.M.c.f.d. of gas because of their greater efficiency, particularly in the recovery of the lighter (LPG) fractions. The short-cycle hydrocarbon-recovery unit process can also be expanded to obtain these lighter fractions. This, however, places them in the gasoline-plant category.

From a practical standpoint, the size of an adsorption tower for 1,000-psi. working pressure is limited to about 6-ft. diameter. Therefore, when throughput increases above about 75 M.M.c.f.d., it becomes more economical to duplicate equipment.

At locations where dehydration of the gas is required for sales, and where otherwise conventional dehydration units would be installed, the economic justification for the hydrocarbon-recovery unit can be based on the difference in cost between the two methods. The length of time required to return the investment with the income from the recovered liquids is usually very short.

Operating problems. As with any new equipment, some operating and maintenance problems have been encountered. Difficulty has been experienced with burned-out tubes in direct-fired heaters and with mechanical failures in the regeneration-gas blowers and motors. Most of these difficulties have been of a mechanical nature and have been solved by modifying the equipment.

To prevent shutdown of the closed-system units because of blower failure, all of the units operated by Shell are equipped with a bypass for open-system flow. Efficiency is lowered during open-flow operation, but gas sales are uninterrupted while the blower is being repaired.

Unit operation. When flashing the hydrocarbons from the regeneration separator to stable stock-tank conditions, part of the recovered liquids are revaporized and vented. Installations of a stabilizer will reduce these losses. Experience indicates, however, that a stabilizer is not needed when it is possible to mix the high-pressure hy-

Condensed from the paper, "Application of Hydrocarbon Recovery Units," by R. C. Visser and H. W. DeYarmett of Shell Oil Co., presented at API Division of Production, southern district meeting, San Antonio, 1960.

drocarbon liquids with heavier condensate recovered during primary separation.

Liquid meters have been installed on most of Shell's units to measure the condensed liquids before commingling with the condensate. This commingling not only eliminated the need for separate handling facilities, but the heavier condensate acts as an absorbent for the lighter fractions. The commingling, of course, should be done before flashing to stock-tank conditions.

Shrinkage of the gas depends upon the richness of the gas stream. Usually it amounts to less than 1%. Fuel requirements for the heaters will be another 0.1 to 0.4% of the total gas stream. This amounts to about 0.8 to 1.5 M.c.f. of gas per bbl. of hydrocarbons recovered.

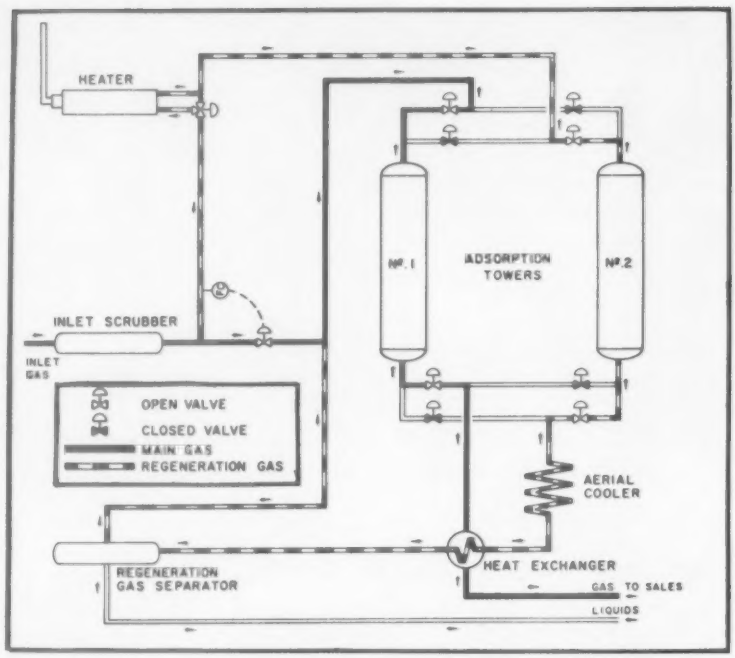
Even though the units are automatic, the recovery efficiency is affected by the amount of interest the operator takes in the process, and his skill. It is important, therefore, that both operators and supervisors have a clear understanding of the process. Despite automatic controls, deviations will occur which affect the efficiency and emphasis should be placed on the proper corrective measures. This, of course, does not mean that full-time attention should be given to "fine tuning" the unit so as to obtain the last possible gallon. The units should be checked at regular intervals by technically trained personnel who have a better understanding of the process principles than is expected of the operators.

Buying equipment. Because of the various types of units commercially available, it becomes rather difficult to select a unit when obtaining competitive bids. Different designs affect different recoveries, so the initial purchase price is not necessarily the prime deciding factor in determining the "best buy."

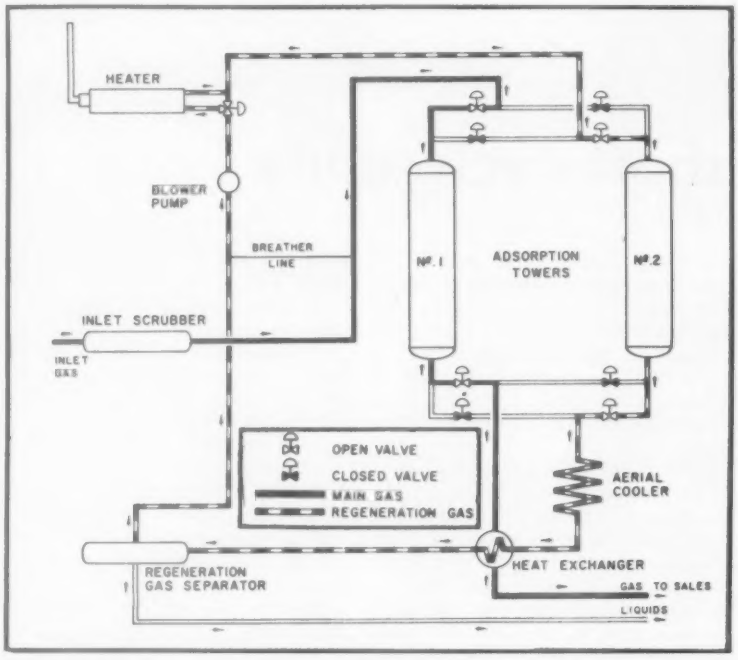
To facilitate comparison, Shell has established certain criteria. One of these is a so-called "recovery factor." This factor is the recovery in barrels per 1,000 lb. of desiccant exposed. For instance, on a unit having a total desiccant volume of 10,000 lb. and a cycle time of 1 hour, the total amount of desiccant exposed per day is 120,000 lb. A recovery of 30 bbl. per day would thus give a recovery factor of 0.25.

This factor expresses the useful capacity of the desiccant and should also give an indication of the expected life of the bed. In general, lower values indicate conservative design and longer life of the bed. Another factor used is the "recovery efficiency." This is the percentage of the isopentanes-and-heavier actually recovered from the inlet stream.

Manufacturers, when bidding on this type of equipment, usually guarantee a minimum recovery at specified throughputs. In general, actual recovery during the early months of operation should exceed those guaranteed. As with conventional dehydration, however, the desiccant bed "wears out" with use and recovery decreases. As yet, no rules have been established as to when a bed should be replaced. On the basis of the decrease in recovery experienced on two units, it appears economical to do so every 1 to 2 years. The other units have not been in operation long enough to establish a trend.



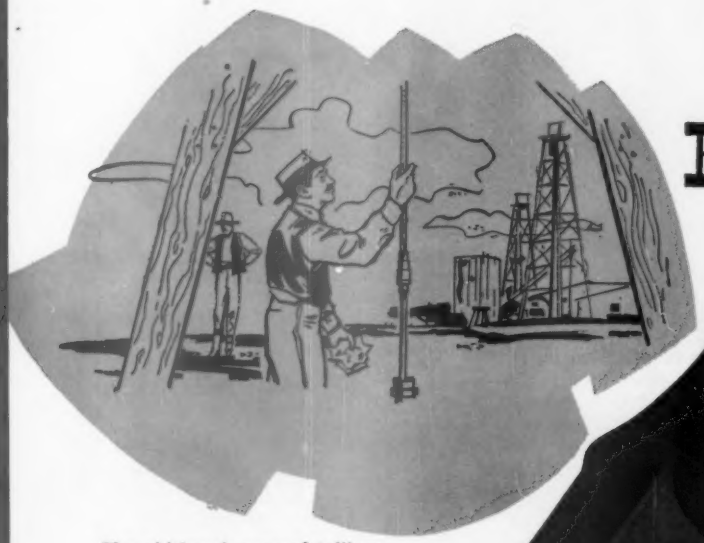
OPEN-SYSTEM type of hydrocarbon-recovery unit uses this flow arrangement.



CLOSED-SYSTEM type of hydrocarbon-recovery unit uses this flow arrangement.

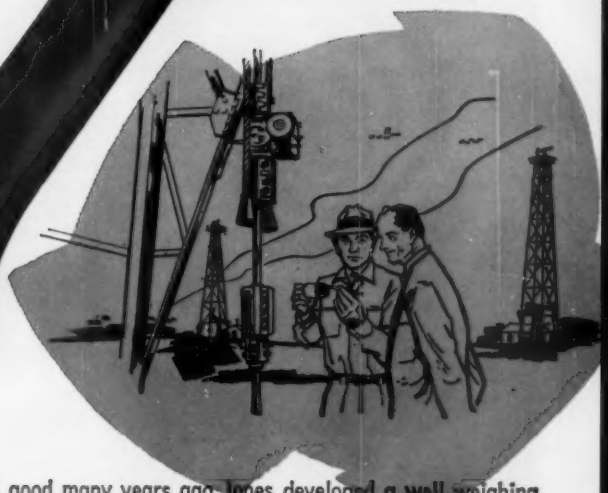
JONES

FIRST IN 1894...



The oldtimer's way of telling how a well was pumping was by feeling the polished rods. Long ago Jones developed more scientific methods to learn about the mechanics of pumping with sucker rods.

FIRST TODAY...



A good many years ago Jones developed a well weighing dynamometer plus the technical knowledge to diagnose the pumping problems of troublesome oil wells and to suggest remedial action. This is the type service you can expect from a **Sucker Rod Specialist!**

...because we're Sucker Rod Specialists!

There are four
JONES JOB-ENGINEERED SUCKER RODS...
a type for every pumping need!

THE S. M. JONES COMPANY

Division of Buffalo Eclipse Corporation

General Office and Factory: TOLEDO, OHIO

Sales Office: Enterprise Building, TULSA, OKLAHOMA

Export Sales Representatives:

IDECO, One of the Dresser Industries, Dallas—New York

Franklin Supply Company, Export Division, Inc., New York

BY W. L. NELSON
Technical Editor and
Petroleum Consultant

Operating costs—hydrodesulfurization

HYDROGEN TREATING or hydrodesulfurization is practiced on so very many different feed stocks that operating costs in the literature range widely (4.5 to 40 cents per barrel). Table 1 indicates somewhat higher costs than the average of those in the literature. Severity of the treatment is a major variable. High-boiling, already cracked stocks (cycle stocks) that contain large amounts of sulfur require severe operating conditions. This means larger circulations of hydrogen, more consumption of hydrogen, higher temperatures, more frequent regeneration of catalyst, and often a higher reaction pressure.

At the other extreme, straightrun naphthas contain little sulfur, they may require scarcely any hydrogen and the catalyst may continue to be satisfactory for a year or even 2 years. The very extreme operation of desulfurizing and hydrogenating residual materials as in some applications of the Gulf HDS process[7], is not considered herein nor is the hydrogenation of lubes[11] considered. Such processes require much more heat, steam, hydrogen, and catalyst regeneration than contemplated herein. Severity has somewhat the following effect on operating costs of 6,000 bbl. per day.

	1956 direct costs,* ct./bbl.
Straightrun naphtha—low S	5-9
Cracked naphtha—low S	7-12
Kerosine—low S	6-11
Kerosine—high S	8-14
Straightrun distillate—low S	7-12
Straightrun distillate—high S	9-16
Straightrun gas oil—low S	8-14
Straightrun gas oil—high S	10-18
Cycle stocks—low S	12-19
Cycle stocks—high S	17-25
Residual high S†	25-40

*Laboratory work, royalty, obsolescence, etc., may add 3-6 cents per barrel.
†Not considered in Table 1. Includes generation of hydrogen.

Operation costs may be converted to current dates by means of the Nelson Operating (Units) Cost Index published in the first issue each month of The Oil and Gas Journal.

Although catalyst may last for several years and its cost is only $0.70-$1.10 per pound, a figure of $4 was used in Table 1 for severe conditions as the equivalent of the cost of catalyst and its regeneration at frequent intervals. Hydrogen was valued at 20-40 cents per M.M. B.t.u. (its fuel equivalent) and it was assumed that hydrogen would be available from nearby catalytic reforming units.

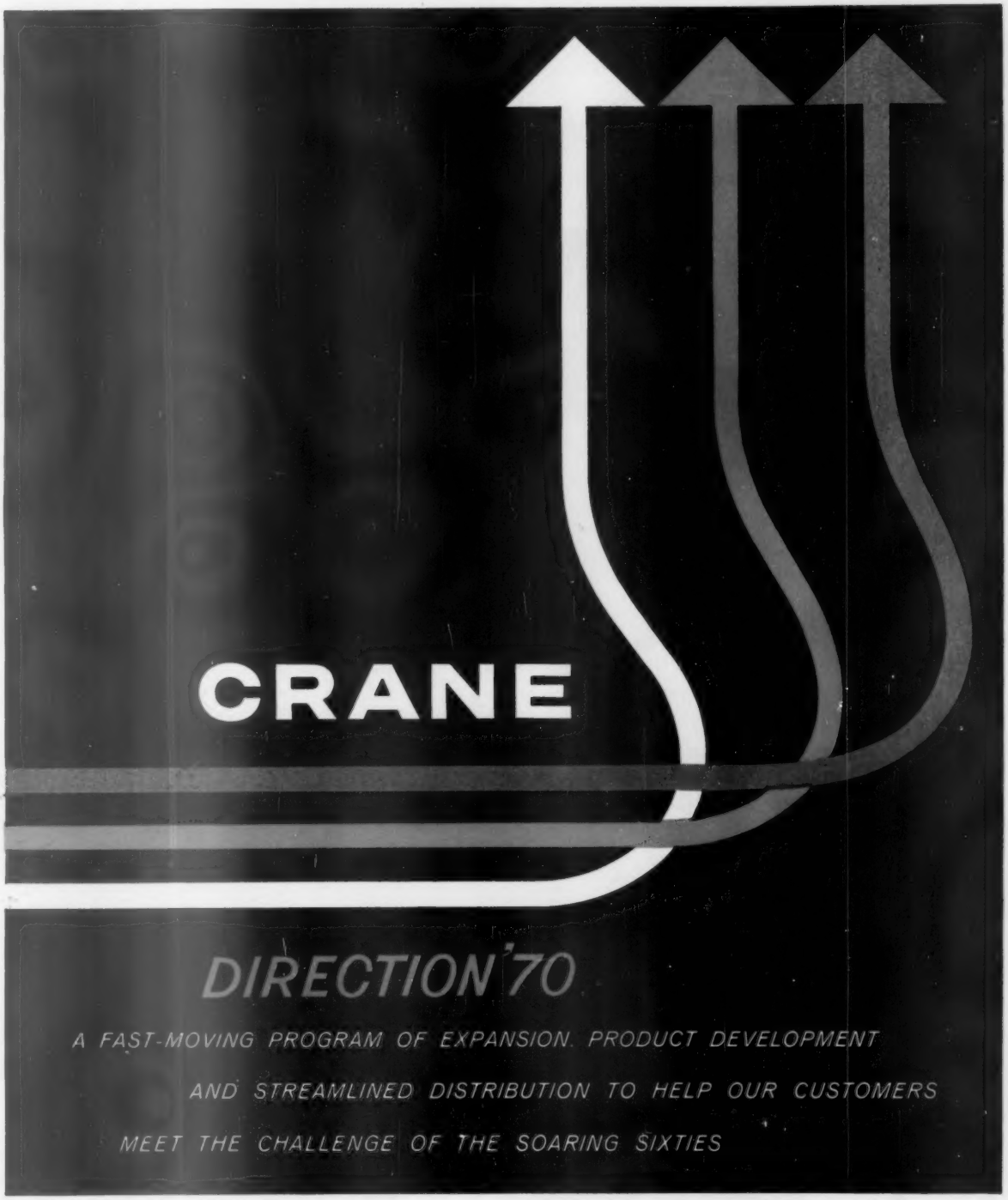
References

1. Anon. (Esso), Booklet entitled, "Hydrofining," 1959.
2. Anon. (Indiana), Ultrafining, Pet. Refiner, September 1958, p. 288.
3. Abbott et al., Vapor Phase Hydrodesulfurization, Pet. Refiner, June 1955, p. 118.
4. Baral et al., What It Costs to Operate a Unifiner, Pet. Refiner, October 1958, p. 133.
5. Connelly, H. T., Catalytic Desulfurization of Cat Cracker Charge Stock, The Oil and Gas Journal, September 14, 1959, p. 88.
6. Hoog et al., New Shell Hydrodesulfurization . . . , Pet. Refiner, May 1953, p. 137.
7. McAfee et al., Gulf HDS Process . . . , Pet. Refiner, May 1955, p. 156.
8. Sanctis et al., The Importance of Hydrodesulfurization . . . ,fifth World Pet. Congress, N. Y. 1959.
9. Weber, George, Better Sulfur Removal, The Oil and Gas Journal, March 17, 1952, p. 169.
10. Zahnstecher & Petrarca, Achieving Catalytic Desulfurization . . . ,The Oil and Gas Journal, December 20, 1954, p. 78.
11. Jones, W. A., Hydrofining Improves Low-Cost-Lube Quality, The Oil and Gas Journal, November 1, 1954, p. 81.
12. Nelson, W. L., Costimating No. 27, Overall Plant Costs, The Oil and Gas Journal, April 1, 1957.

TABLE 1—ELEMENTS OF OPERATING COSTS—CATALYTIC HYDRODESULFURIZATION (cents per bbl.—1956)

Element	Unit (somewhat standard)	1956 unit cost	Operating cost (1956) 6,000 B/D plants mild	severe	See Process Costimating No.
Labor: Supervision	0.3-0.5 men/shift*	$3.85/hr.†	*0.4 -0.7	*0.5 -0.8	26, 28, 41, 42, 44
Operating	1-4 men/shift*	$3.12/hr.†	*1.2 -5.0	*1.2 -5.0	
Maintenance	3-5%/yr. of replacement	$140-$220/daily bbl.	1.1 -2.0	1.8 -3.0	29
Fuel (heating and vaporization)	30-90X10³ B.t.u./bbl.	20-40 ct./M.M. B.t.u.	0.6 -2.4	1.4 -3.6	3, 4, 6, 30
Compression	0.02-0.08 hp.-hr./bbl.	1.8 ct./hp.-hr.	0.03-0.1	0.07-0.14	22, 24
Steam	8-45 lb./bbl.	45-60 ct./M. lb.	0.4 -1.8	0.7 -2.7	17, 18
Electric power	0.8-2.2 kw./bbl.	0.85 ct./kw.-hr.	0.09-0.13	0.1 -0.2	14
Cooling water	25-80X10³ B.t.u./bbl.	1.7 ct./M. gal.	0.2 -0.55	0.2 -0.55	15, 16, 38
Hydrogen	50-800 cu. ft./bbl.	5-10 ct./M.s.c.f.‡	0.25-3.0	1.2 -8.0	
Catalyst	100-700 bbl./lb.	$1.10-$4/lb.§	0.5 -1.2	1.0 -3.0	
Total direct costs (probable extremes)			6-14	12 -23	
Royalty	1.5 ct./bbl.($35/d. bbl.)		0 -1.5	0 -1.5	7
Obsolescence, insurance, taxes and interest					
Laboratory	7%/yr. of replacement	$140-$220 daily bbl.	2.7 -3.4	3.3-4.2	
	0.5-0.75 men/shift	$3.12/hr.†	0.6 -0.9	0.7-1.0	
Other costs (probable extremes)			3.6 -4.5	4.5-6.2	

*Conducted as a separate operation. Small independents use smallest number of men and major operators the largest number.
†Average U. S. wages including 27% for all burdens.
‡Fuel-oil equivalent of 20-40 cent-fuel.
§Cost of repeated regeneration.

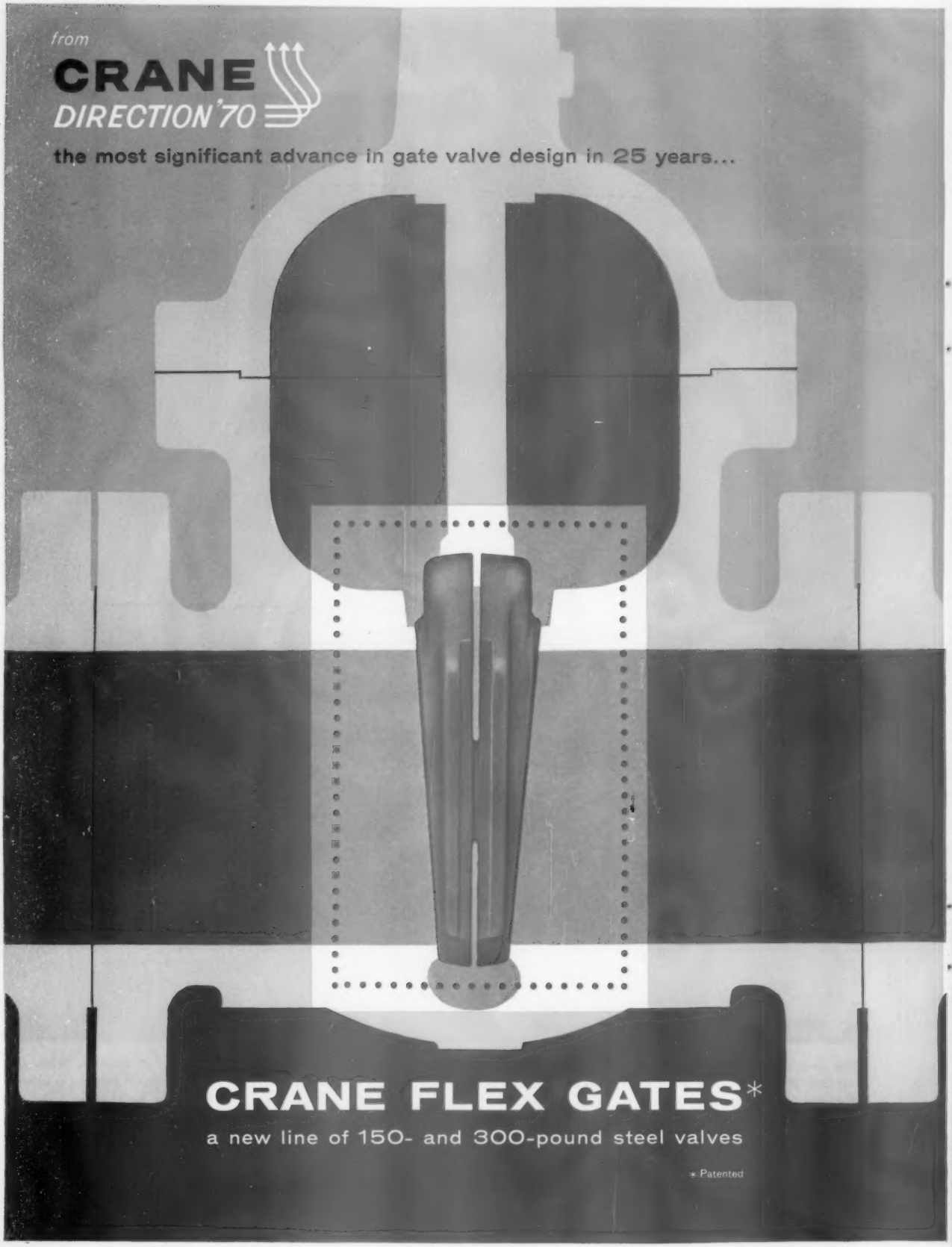

CRANE
DIRECTION '70
A FAST-MOVING PROGRAM OF EXPANSION, PRODUCT DEVELOPMENT
AND STREAMLINED DISTRIBUTION TO HELP OUR CUSTOMERS
MEET THE CHALLENGE OF THE SOARING SIXTIES

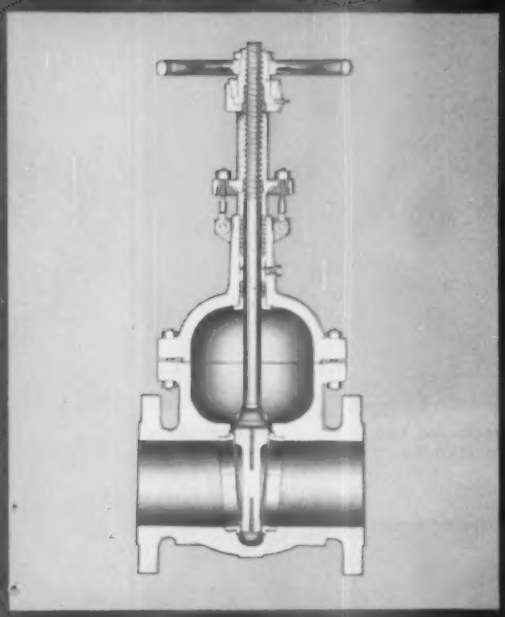
The Soaring Sixties have begun. This is the decade to be marked by accelerated industrial growth. By 1970, predictions are that . . .

- machinery production will double
- petroleum production will increase 4% to 5% each year
- chemicals are to double their present output at the current compound growth rate
- food processing will rise nearly 40%, paper and allied industries will expand about 60%

Total industrial production is estimated to rise some 60% in the next ten years. Looking at it another way, the prospective *increase* in manufacturing and mining is almost as large as the total output of just 12 years ago.

Crane announces Direction '70 . . . new products to help industry meet the challenge of the Soaring Sixties. These are products to improve quality control. These are products to increase production. These are products to help you control your costs. On the following pages is the first . . . the most significant Gate Valve improvement in 25 years. It's the first announcement of many you'll be seeing from Crane in Direction '70.


from
CRANE
DIRECTION '70
the most significant advance in gate valve design in 25 years...
CRANE FLEX GATES*
a new line of 150- and 300-pound steel valves
* Patented



Instead of being made with a solid disc, new Crane Flex Gates have separate disc faces, connected by the spool-like unit you see in the cross section. This joins the two seating faces, yet provides flexibility for the faces to seat tightly with independent action.

FLEXIBILITY PROVIDES THESE BENEFITS

BECAUSE THEY'RE FLEXIBLE, new Crane Flex Gates seat with less torque.

BECAUSE THEY'RE FLEXIBLE, new Crane Flex Gates unseat with less torque . . . will not stick closed even in high temperature service.

BECAUSE THEY'RE FLEXIBLE, minor deflection of seating faces due to pipe strains does not affect tightness of Crane Flex Gates.

BECAUSE THEY'RE FLEXIBLE, new Crane Flex Gates are tight on inlet seat and outlet seat over a wide range of pressures.

BECAUSE THEY'RE FLEXIBLE, new Crane Flex Gates can be used singly in some services where two conventional gate valves are frequently specified. You can save substantially on piping costs. And they have been exhaustively field tested.

BECAUSE THEY'RE FLEXIBLE, new Crane Flex Gates can be serviced—body seat rings replaced or seating faces refinished—quickly without painstaking accuracy. Slightly off-taper seats do not affect tightness or operating ease.

BECAUSE THEY'RE FLEXIBLE, new Crane Flex Gates will easily outperform any conventional solid wedge disc valve you now use. *And there's no increase in price.*

BECAUSE THEY'RE MADE BY CRANE, these new Flex Gates are completely dependable. You can use them with complete confidence on steam, water, gas, oil or oil vapor service. Stem and disc seating faces are Crane Exelloy. Shoulder-type body seat rings are Exelloy or Crane No. 49 Nickel Alloy. Sizes 12 inch and smaller; 150- and 300-pound pressure classes.

• • • • •

Ask your nearby Crane Distributor for full information on Flex Gates—and for data whenever you work with the products Crane makes. He has the newest in information *and* products. Crane Co., Industrial Products Group, 4100 South Kedzie Avenue, Chicago 32, Illinois.

CRANE

VALVES • ELECTRONIC CONTROLS • PIPING
PLUMBING • HEATING • AIR CONDITIONING

How to apply and remove shrunk-on tool joints

BY E. G. BOICE
Tubular Products Engineer,
Reed Roller Bit Co., Houston

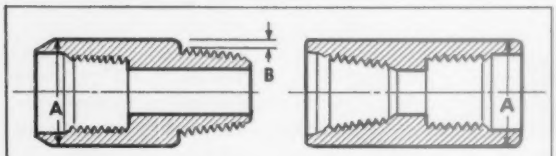
IF YOU ARE an operator with a drilling string joined by good hand-applied tool joints, you are lucky.

When the drill pipe is worn or damaged, these same tool joints can, with proper care and handling, be removed and successfully applied to new pipe. Likewise, it is reassuring to know that the pipe can be economically rejointed on location even as drilling progresses.

Most shrunk-on tool joints embody the principles of the cylindrical land and a fixed landing shoulder. Design of these joints makes field application and removal as nearly foolproof as possible. Still, there may be pitfalls for those who try to change out a string of joints without instruction.

This article outlines procedures that

Salvaging good tools from scrap pipe



A—Minimum o.d. of tool joint on drill-pipe end.
B—Minimum allowable box shoulder width on both eccentrically and concentrically worn tool joints.

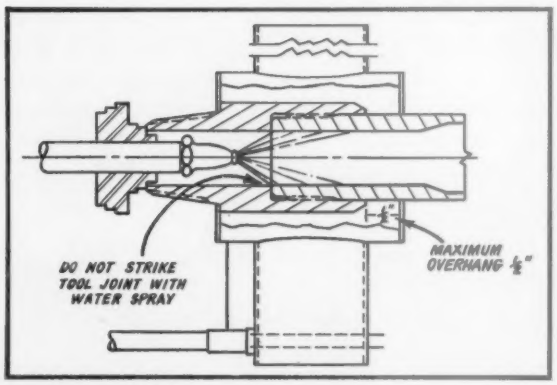
MAXIMUM ALLOWABLE WEAR DIMENSIONS FOR DISCARDING TOOL JOINTS
(Inches)

Connection Size, In.	API Full Hole		Extra Hole		API Internal Flush	
	(A) Min. O.D.	(B) Rad. Sh. Width	(A) Min. O.D.	(B) Rad. Sh. Width	(A) Min. O.D.	(B) Rad. Sh. Width
2-⅞		5/32			3-13/16	3/16
3-½	4-7/16	5/32		¼	4-7/16	3/16
4	4-⅞	3/16			5-⅛	¼
4-½	5-⅜	3/16	5-⅜	¼	5-¾	7/32
5			9/32	9/32		
5-½	6-½	9/32				

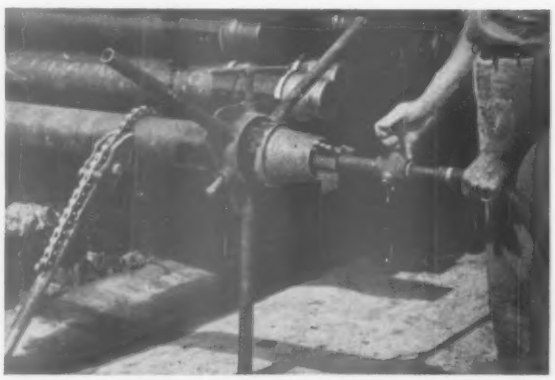
Note: The above figures are intended as a guide, and in some cases may not be applicable, especially when other general conditions of the connection are considered, such as thread and shoulder condition.

A USE these maximum allowable wear dimensions as a guide for discarding tool joints on a string of drill pipe.

B PLACE removal heater on tool joints. Joint is heated to 700° F., swelling joint so it can be screwed off undamaged.



C BACK OF HEATER should overhang tool joint ½ in. In applying coolant to drill-pipe end, do not allow water spray to touch inside diameter of tool joint.

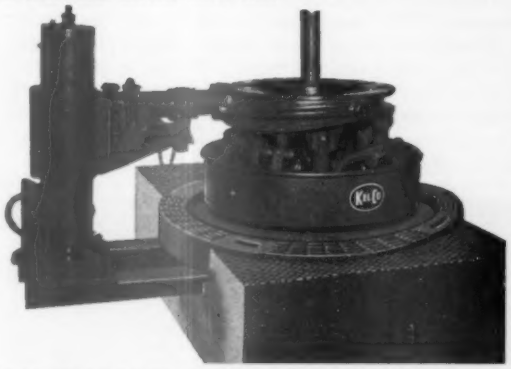


D APPLY WATER SPRAY to inside of pipe before removal of tool joint. This cools the drill-pipe end, shrinking it so tool joint is easily removed.

KELCO *Safety Products*

AIR OPERATED POWER SLIPS

KelCo is the designer of the industry's first successful power slips. They are the only slips having incorporated into the assembly a slip bowl. KelCo Power Slips have been in successful service since 1941.



KelCo Model J-6 Slips will handle from 2⅝" drill pipe thru 7" casing. ONLY 5" TRAVEL TO RAISE AND LOWER SLIPS.

KelCo Model J-6-J "Slim Hole" Slips for small rotaries. Will handle 2⅜" thru 3½" drill pipe or tubing, plus 4½" and 5" casing.

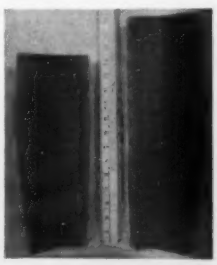
KelCo Power Casing Slips. Foot controlled by driller. Protects casing. Gives faster, safer operation. For 4½" thru 7" casing.

NOTE THESE FEATURES OF KelCo POWER SLIPS

- Patented Automatic Safety Latch operates with each lift of slips.
- Straight in and out movement of dies.
- Solid Slip Bowl.

KelCo Standard Dies—more contact area than any other slips. Have been used successfully to 22,000' without pipe damage. Appx. 156 sq. in. of contact on 4½" dies.

KelCo "Long Dies"—the only answer to problems encountered with drill pipe when drilling below 20,000'. Appx. 186 sq. in. of contact on 4½" dies.



STANDARD LONG DIES

KELCO BEN F. KELLEY CO., Inc.
TULSA, OKLAHOMA

SALES AND SERVICE, REPRESENTATIVES IN CANADIAN AND U. S. OIL CENTERS. FOR SALE THROUGH YOUR FAVORITE SUPPLY STORE—EXPORT AND DOMESTIC.
CATHEADS • POWER SLIPS • TUBING TONGS

LOWER Lifting Costs with Thompson OIL WELL PUMPS

Sand Resistant ROD PUMPS

Top Hold Down Insert Rod Pump

Standard Size, Figs. 400T, 500T

Self-aligning double plunger insert pumps. Made in three types: combination cup and single plunger; combination cup and double self-aligning type; and metal-to-metal double plunger self-aligning type. All are equipped with Regular or Extra Long Alloy Plungers, ground individually to fit the barrels, assuring longer life on both pump and surface equipment.

Traveling Plunger Rod Type

Bottom Hold-down Pump

Standard Size, Figs. 400P, 600P, 700P, 800P

Single or double, self-aligning, combination cup and plunger or all-metal traveling plunger type, rod pumps made in four sizes: regular 1½", 1⅝" oversize, 2" regular and 2⅛" oversize bore. These pumps seat in API seating nipples.

SERVICE STORES for your convenience! Stores have service men as well as salesmen to serve you . . . prompt pick-up and delivery!

SERVICE STORES
Drumright, Okla.-Ph. 462 — Natchez, Miss.-Ph. 4795
Edmond, Okla.-Ph. 126 — Oil City, Miss.-Ph. 4615
Eunice, Kansas-Ph. 1479 — Reed City, Mich.-Ph. Town 2-2461
Headrick, Okla.-Ph. 668 — Seminole, Okla.-Ph. 610
Heidelberg, Miss.-Ph. 3871 — Shidler, Okla.-Ph. HI 3-2011
Kilgore, Texas-Ph. 3614 — Stephens, Ark.-Ph. ST 6-5887
Vivian, La.-Ph. 3580

SUPPLY STORES
Koonp Oil Well Supply, Gainesville, Texas — Midway Pipe & Supply Co., Greggton, Texas
John & Paul Pump & Supply, Gladewater, Texas — W-B Pump & Supply Co., Pampa, Texas
Jack Yates Pipe & Supply Co., Gladewater, Texas — B-H Pump Service, Salmon City, Texas
Happy Co., Salem, Illinois

Thompson PUMP COMPANY

Drawer 591 — Okmulgee, Oklahoma

will result in the fastest, cheapest, and most satisfactory jobs. We'll take the procedure in four steps:

1. Removing good tool joints from junk pipe.
2. Removing scrap tool joints from good pipe with a torch.
3. Inspecting salvaged pipe before applying new joints.
4. Applying new or salvaged joints.

Salvaging Tool Joints

An accompanying table shows recommended tool-joint maximum-allowable wear data. Use these data as a guide to decide when to replace tool joints on a string of drill pipe. The wear on the outside diameters of the tool joints should not progress past the point where it no longer adequately supports the pipe.

To remove tool joints undamaged from drill pipe for reapplication, we must duplicate the same conditions present during the original application of the joints. The tool joint must be hot and the end of the pipe cool. We produce these conditions by heating the tool joint with a tool-joint heater and cooling the end of the drill pipe with water.

It is much easier to examine and gage pins and boxes before the tool joints are removed from the pipe. With an inspection before removal, the tool joints can be classified and marked as acceptable, salvageable (requiring some reworking), or scrap.

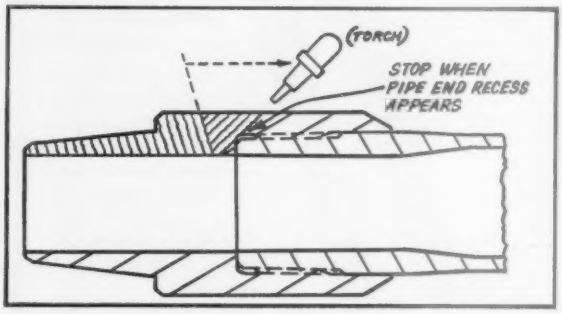
The working end of the drill pipe should be elevated about 4 in. above the pipe rack so that the coolant will drain away from the working space. The pipe must be secured with holding tongs or pipe tongs to prevent rotation when torque is applied to the tool joint.

Place a tool-joint-removal heater on the tool joint so that the back of the

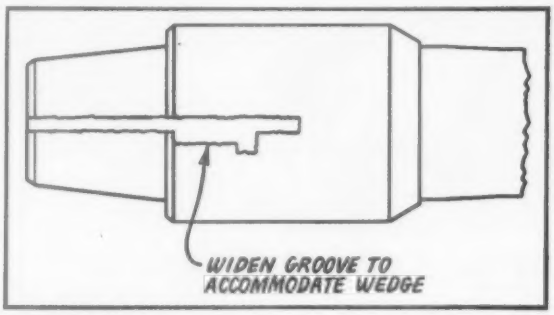
Removing scrap joints from good pipe

A **BEGIN CUT** at leading angle, stopping at safe distance from pipe end.

B **CONTINUE** making the cut cautiously, this time at lagging angle.



C **CUT** until the pipe-end recess appears in the bottom of the cut.



D **WIDEN CUT** adjacent to pipe end to accommodate a steel wedge.

E **WITH TORCH** parallel to pipe, complete cut from pipe end of tool joint. Do not cut closer than 3/16 in. from the pipe threads.

F **INSERT WEDGE** in widened portion of cut and strike several blows with sledge hammer. This should cause uncut portion to break apart.

heater overhangs the tool joint a maximum of ½ in. Heat the tool joint to approximately 700° F. Temperature can be checked with a 700° F. Tempilstik as heating progresses. Check that portion of the tool joint and drill pipe that was covered by the heater. When the Tempilstik mark becomes liquid, the joint is ready to remove.

When the tool joint reaches 700° F., the heater should be removed and a removal wrench placed on the tool joint to rotate counterclockwise. Water spray the inside of the end of the drill pipe, making sure that no coolant falls or sprays on the inside diameter of the tool joint. On 4½-in. tool joints, the interference will be relieved in approximately 20 to 30 seconds after the water is applied.

Exert about 300-ft.-lb. of torque on the removal wrench. Do not force the joint. If torque is too high before interference has been relieved, there may be galling in the threads, on the pipe lands, and in the tool-joint counterbores. If interference is properly relieved, the tool joint will break easily with the removal wrench.

Sometimes a stubborn joint can be loosened by exerting the torque and tapping the outside of the tool joint with a hammer. Once the tool joint has loosened, it should be quickly unscrewed with a fast continuous rotation. The tool joint should be allowed to cool slowly in air and should not be cooled with water.

If there is difficulty in this procedure for removing joints, temperature of the joint may be raised to a maximum of 900° F. If the tool joint or drill pipe is to be reused, each should be checked with a 900° F. Tempilstik to insure against overheating. This temperature of 900° F. applies only to the upset of the pipe. Temperature in the body of the pipe must never exceed 400° F.

Removing Scrap Joints

The oxyacetylene torch is often used to remove scrap tool joints from drill pipe which is to be rejointed with new tool joints. Here is the proper procedure for doing this:

Starting on the working connection end of the joint, make a longitudinal cut at a leading angle, being sure to stop the cut a safe distance from the end of the drill pipe.

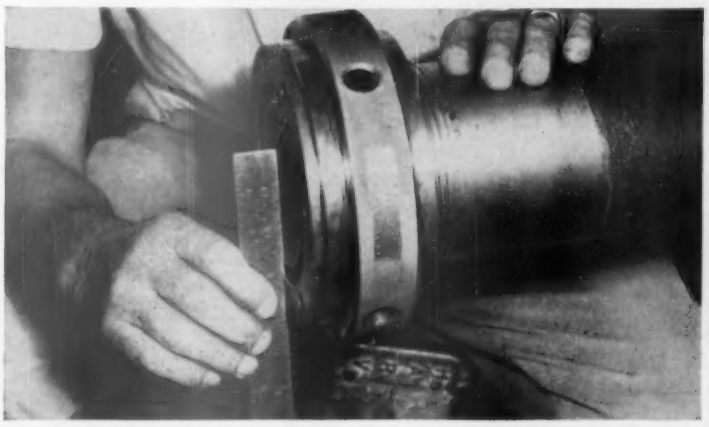
Change the angle of the torch in the longitudinal cut to a lagging angle of approximately 45° and continue cutting until the recess on the end of the pipe shows up in the bottom of the cut. Widen the cut adjacent to the end of the pipe to accommodate a steel wedge.

Lay the torch approximately **parallel** to the pipe in line with the partially completed cut and adjacent to the pipe end of the tool joint, and resume cutting longtudinally, continuing until the cut is completed. **Do not attempt to cut any closer than 3/16-in. to the pipe threads.** This uncut portion can be broken with a wedge when the assembly has cooled sufficiently. Extreme caution should be exercised so that the land and threads on the pipe are not damaged.

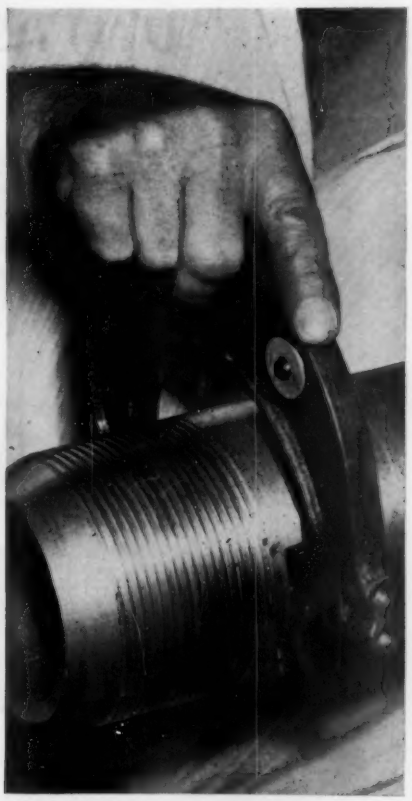
When the assembly has cooled off, insert a 12-in. wedge (2 by 2-in. on butt end and 2 by 1/16-in. on entering end) in the slot adjacent the end of the drill pipe and hit it several sharp blows with a sledge hammer. The uncut portion of the tool joint

Inspecting salvaged pipe before applying new joints

A **CHECK THREAD PROFILES** with thread gage. No light should show between thread and gage.



B **PIPE END** should be flush to 1/16 in. recessed from face of hand-tight gage.



C **CHECK PIPE** land diameter with micrometer.

Explorer Rocket

THE MOST IMITATED

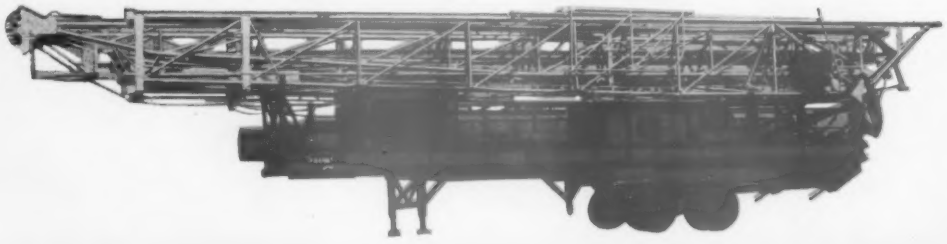
Explorer Cruiser

UNITS IN THE FIELD...

Clipper

Comet

BUT NOT DUPLICATED



OFTEN IMITATED . . . NEVER DUPLICATED

WORTH MORE WHEN YOU BUY 'EM
WORTH MORE WHEN YOU TRADE 'EM

Common sense will tell you that there **is** a difference in most things despite the tendency to imitate the leader. There's a difference in baseball players . . . in cooks . . . yes, even in oil well servicing units . . . although competitive units are getting to look mighty like the Franks Explorer.

Now, this **difference** is what keeps the Franks Explorer ahead of the pack. It's the difference which makes superintendents prefer Franks units on their jobs. It's the difference you feel in your pocketbook when you trade it in. The higher resale value of Franks Explorers speaks louder of this difference than any words we can dream up.

Ask the man who uses Franks!

"WORTH MORE" FRANKS FEATURES

- Full view control console
- Engineered weight distribution
- True capacity rated derricks, 100,000 to 275,000#
- Less downtime thru industrial engine economy, power and dependability
- High resale value as used equipment
- Field acceptance established

ON THE SPOT . . . 'ROUND THE CLOCK . . . FIELD SERVICE

WELL SERVICING AND DRILLING UNITS
FRANKS
DIVISION OF
PAMPA, TEXAS
CABOT

OFTEN IMITATED . . . NEVER DUPLICATED

should break apart, thereby allowing the joint to be unscrewed from the pipe by hand.

Inspecting Salvaged Pipe

After cleaning threads and lands, a close visual inspection should bring to light any defects on these elements. Battered or rough threads may be filed with a small three-cornered file if special care is taken that the starting thread is smooth and any existing burrs removed.

Lands can be smoothed up with fine emery cloth. This procedure will also bring out any surface imperfections and prepare the lands for subsequent measuring operations. Any minor defect in the end seal or land on the pipe may be repaired by brazing and filing the surface down to conform to the original general contour.

If a thread form gage is available, the thread profiles can be checked. The gage should fit the profile of the thread so that no light shows between the thread and the gage. If the profile gage indicates a great abnormality in the threads, then the thread scheme should be checked with a thread ring gage. On pipe threaded for this type of hand-applied tool joint, the end of the pipe should be flush to 1/16-in. recessed, with respect to the gaging face of the gage when the gage is in a hand-tight position on the threads.

Magnetic-particle inspection should be used on the area of last engaged pipe thread and on the lands if:

1. The drill pipe has been run loose in the tool joints.
2. The drill pipe has been subjected to abnormal operating procedures.
3. The tool joints are worn thin adjacent to the counterbore section.

A weakened support in this section may lead to ultimate fatigue failure of the pipe in the land-thread junction area.

Magnetic-particle inspection can be used to indicate the existence of drill pipe damage but it cannot be used to identify all of the damaged drill pipe that may be in the string.

Check the diameter of the pipe lands with a micrometer. Refer to original pipe and specifications for size tolerances. The pipe ends should be within the original specifications for successful reapplication of tool joints.

Inspecting Salvaged Joints

Clean up tool joints to a bright finish free of all grease and dirt. Counterbore diameters should be measured for size and ovalness. If possible, use a plug gage for this operation.

In addition to checking size and ovality, the plug gage also detects internal protrusions in the counterbore, caused by external deformation, called "dinges," especially on the bevel on the pipe end of the pin and on 18° elevator shoulder bevels. These internal protrusions in the counterbore prevent proper application of the tool joint and should be reworked or the joint scrapped.

The inside seal shoulder in the tool joint should exhibit no surface imperfections.

Applying Tool Joints

Tool-joint counterbores and pipe lands are made to a tolerance of plus or minus 0.002-in. from the nominal diameter. These counterbore sizes are divided into three classes: "S" (Small), "N" (Nominal) and "L" (Large). On tool joints, these identifying letters are stamped on the beveled pipe end of the pins and on the elevator shoulder of the boxes. If the box has a hard metal band, the mark will be found near the heat code on the outside of the box.

Drill pipe is similarly marked S, N, and L on the end diameter of the pipe next to the end seal.

It is best to match these diameters on tool joint and pipe, especially on sizes smaller than 3½ in. However, to balance out the joints and the pipe, it is permissible to put an S joint on an N pipe or an N joint on an L pipe. **DO NOT** put L joints on S pipe or S joints on L pipe.

There should be plenty of space for tool-joint heaters, with ample room between the ends of the pipe and the heaters. This gives the operator working space free from heat and flame.

Do not roll the drill pipe after applying white lead to the end seal as foreign matter may fall out of the pipe and adhere to the seal.

Let us say again that the entire tool joint must be cleaned of any grease or foreign matter. The pipe thread end must have the counterbore, threads, and sealing shoulder thoroughly cleaned to a bright, clear finish and free of **all** grease and foreign matter.

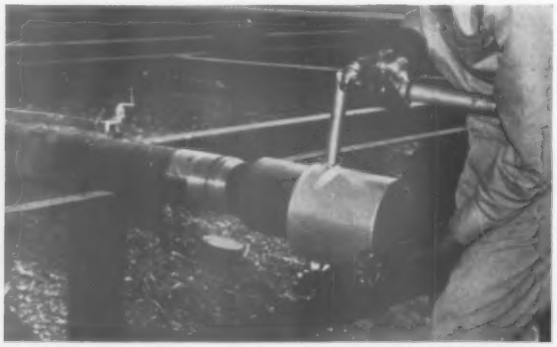
After cleaning, gaging, and inspecting the pipe, roll it into position to apply the joints. Place holding tongs on the pipe, apply a light coat of 30-weight engine oil to threads and land. Apply a thin coat of red or white lead to the end seal of the pipe.

Select a joint to match the pipe land diameter and place it in the heater. Heat the joint and check that portion of the joint that is inside the heater with a 650° F. Tempilstik. When the Tempilstik mark melts, the joint is 650° F. or above. The joint should also be checked with a 900° F. Tempilstik to insure against overheating. If the 900° F. Tempilstik melts, the joint should not be used until checked by a factory-authorized representative.

It is possible to speed the installation operation. Do this by clocking the **time** necessary to bring the joint

Putting on new or salvaged joints

A **PLACE TOOL JOINT** in heater before application.

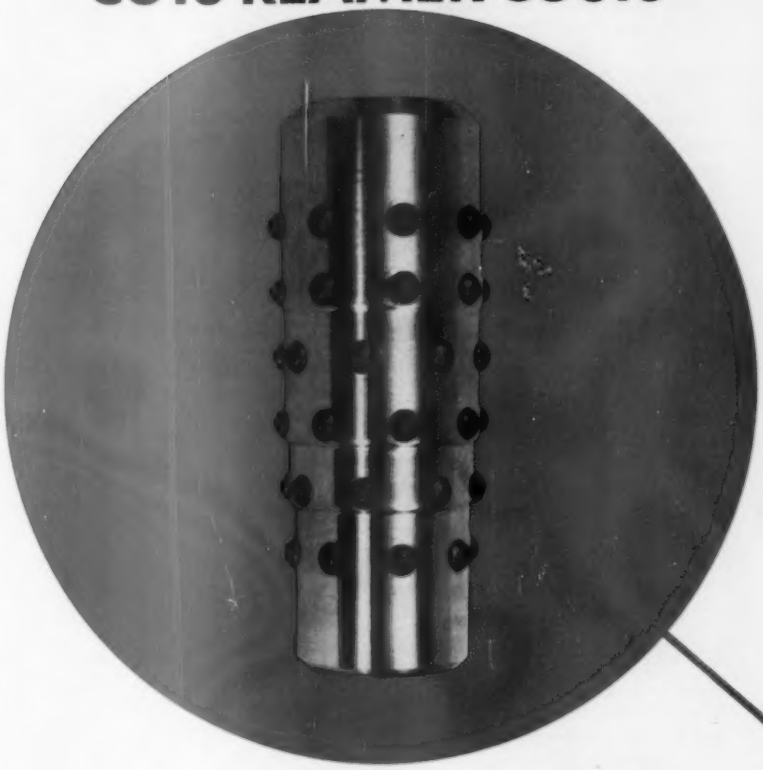


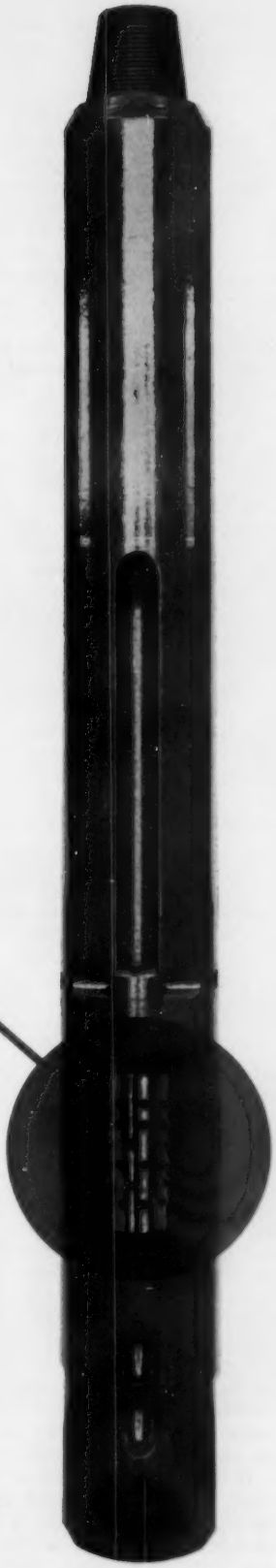
B **PUT TOOL JOINT** on pipe end with application wrench.

TUNGSTEN CARBIDE COMPACTS MAKE THE DIFFERENCE!

KNOBBY

CUTS REAMER COSTS





Reamer costs in hard formation areas are being reduced as much as 70% by Drilco's NEW and EXCLUSIVE Mark VI Knobby Reamer Cutter —the only reamer cutter using Tungsten Carbide compacts.

Performance comparisons prove that one set of **Knobby** Cutters will outlast five to ten sets of conventional cutters . . . and the **Knobby** insures you of a full gage hole all the way.

The **Knobby** means superior performance and lower rig costs. See your **Drilco** representative.

Representatives in:

CALIFORNIA
Bakersfield FA 3-8482
CANADA
Calgary CH 9-6551
COLORADO
Cortez LO 5-8626
KANSAS
Liberal MA 4-6801
MISSISSIPPI
Laurel 8-8271
LOUISIANA
Shreveport 2-8502
Lafayette CE 2-2261
NEW MEXICO
Hobbs EX 3-4382
Farmington DA 5-0571
OKLAHOMA
Oklahoma City CE 2-9704
TEXAS
Snyder HI 3-638
Graham LI 9-1944
Houston WA 8-5047
Odessa FE 2-2041
Midland MU 2-5238
WYOMING
Casper 23-73804

DRILCO OIL TOOLS inc.

Drawer 3135 Midland, Texas

DRILL COLLAR STABILIZERS
ROTARY REAMERS
DRILL COLLARS
SUBS
DRILL COLLAR TORQUE INDICATORS

to 650° F. This time schedule may then be used. Periodic checks should be made with the 650° F. and 900° F. Tempilstiks to insure that the temperature limits are maintained.

Remove the joint from the heater and place on a clean piece of sheet metal. Check the temperature. Assemble an application wrench on the joint. Place the joint on the pipe and, with the center line of the joint in line with the center line of the pipe, turn joint clockwise slowly. When the joint is turning smoothly, increase the turning speed and continue until the joint shoulders. **It is essential** that the application of the joint be made in a continuous operation.

The end of the drill pipe must seal against the seat in the tool joint. After assembling, check the end seal between the tool joint and the pipe, using a 0.0015-in. feeler gage. If the joints do not make up shoulder tight, they should be removed and reinstalled or replaced with new joints.

If the tool joints are to be protected with a lubricant, use a zinc-base lubricant but do not apply it until the tool joints return to atmospheric temperature. If the pipe is to be stored for any length of time before use, the joints and about 6 in. of the pipe should be painted, exercising care that paint does not get on the shoulders of the tool-joint pins and boxes.

Some Trouble Sources

Often, tool joints are applied in extremely hot weather. In some cases, this can cause the drill pipe to expand in the land area and results in interference between the hot tool-joint counterbore and the land. In order to get the maximum clearance here for assembly, it is advisable to cool the pipe down with water just before assembly.

Also, where a tool joint has been cut off with a torch, it is not advisable to attempt applying a new tool joint immediately.

Take care not to heat tool joints too rapidly for application. A joint that has been rapidly heated will seize on the threads before proper shouldering against the end of the pipe. There is a false indication when the tool joint appears to "bump" the end of the pipe though it has actually seized on the threads. This condition can be readily checked with a 0.0015-in. feeler at the end of the pipe after the tool joints have cooled down.

If the counterbore ends of the tool joints have been damaged externally by a surface indentation, it is quite likely that there is an internal protrusion in the counterbore. This can prevent the joint from being properly applied.

Jet-fuel parasite killed

METHODS of killing fungi and bacteria which have an appetite for jet fuels are being found by Southwest Research Institute in San Antonio.

The micro organisms are sloppy eaters. When they feed on jet fuel in storage tanks, they leave sludge and scum as byproducts of their feeding.

This material causes trouble, such as clogging of fuel filters and strainers. No direct engine failures have resulted, but the problem is a costly and serious nuisance.

Certain fungi and bacteria have been isolated from contaminated fuel samples and the institute has tested about 400 chemicals for growth inhibition of the micro organisms. The successful ones are being formulated into a variety of proprietary products.

Preliminary studies show the bacteria apparently live in water that accumulates in the bottom of storage tanks. They appear to be airborne and enter the tanks through vents.

Once inside the tank, the bacteria and fungus spores settle on the liquid surface and then sink to the water layer. From there they migrate to the fuel-water interface and feed on the fuel.

Bacteria and fungi affect a wide range of organic compounds, the institute found. Such things as paints, rubber, c a n v a s, and plastics have been damaged.

Research efforts by others have resulted in the finding that boron, a gasoline additive, is an effective killer of rust-causing bacteria in gasoline storage tanks (OGJ, Apr. 11, p. 95).

Nelson Refinery Cost Indexes

Published in the first issue each month in the Technology-Operation Section.

Compiled by W. L. Nelson, Technical Editor and petroleum-refinery consultant, Tulsa.

Charts of the indexes are published each year in a late January or early February issue.

Indexes of selected individual items of equipment and materials are also published on the Costimating page in the first issue of the months of January, April, July, and October.

Refinery Construction Cost Index (1946 Basis)

Explained on page 101 of the issue of August 5, 1957.

	1950	1954	1957	1958	1959	Jan. 1960
Pumps, compressors, etc.	138.2	166.5	206.7	214.7	226.5	227.0
Electrical machinery	134.9	160.0	188.9	192.7	195.8	197.5
Internal-combustion engines	126.0	150.5	173.9	178.3	178.5	177.9
Instruments	127.8	154.6	187.4	194.9	201.0	198.6
Heat exchangers	140.0	171.7	203.6	181.2	178.9	192.1
Misc. equipment average	*126.2	160.7	192.1	192.4	196.1	198.6
Materials component	149.5	174.6	201.9	204.2	207.8	208.9
Labor component	144.0	183.3	208.6	220.4	231.6	237.3
Nelson construction index	146.2	179.8	205.9	213.9	222.1	226.0

*Used in computing the Nelson Index until April 1952.

Refinery Operating Cost Indexes (1956 Basis)

Explained on page 171 of the issue of June 1, 1959.

	1946	1952	1954	1958	1959	Dec. 1959
Fuel cost	49.6	81.0	86.5	*102.1	103.5	105.4
Labor cost	73.1	88.7	90.9	105.0	102.3	97.6
Wages	52.4	81.5	88.7	105.4	111.5	110.4
Productivity	68.3	90.2	97.1	100.3	109.9	113.1
Investment, maintenance, etc.	51.2	83.6	92.0	109.5	113.7	115.5
Chemicals cost	37.0	72.1	85.7	104.4	107.8	118.3
Operating cost indexes:						
Refinery	58.5	80.5	88.7	*105.8	106.8	107.3
Process units†	62.9	82.2	88.4	105.8	106.0	104.5

*Revised. †Add separate index for chemicals, if any are used.

THE OIL OF TOMORROW may come from deep beneath the icy wastes of the Arctic. If it is there, our petroleum industry will find it, produce it and thus add to precious petroleum reserves . . . and O-C-T will be there with the best possible equipment and service.

Free full color print of above illustration, suitable for framing, upon your request.

where progress is a daily practice

O·C·T

OIL CENTER TOOL CO.

SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

Address Export Inquiries for All Countries to
P. O. Box 3091, Houston, Texas.

The redesign of this forging solved a machining problem

BEFORE: Forged on an upsetter, this cylinder presented minor machining problems for the customer. The forging had to be trimmed on the sides; this resulted in flat spots, uneven cuts. It was also difficult to keep the OD concentric with the bore.

AFTER: Made on a mechanical press, this cylinder offers a better surface for machining. Sides don't have to be trimmed, so there are no flat spots, no uneven cuts to worry about. No gripping collar, either. Concentricity of OD and bore is excellent.

Steel

for Strength
. . . Economy
. . . Versatility

In this case a mechanical press produced a better piece for the customer than an upsetter. But we know many cases where the opposite is true. One of the nice things about doing business with Bethlehem is knowing we'll recommend the one "right" method of manufacture the first time around. We have the experience, and the facilities (press, hammer, drop, and upsetter) to back up our recommendations. A chat with one of our design engineers costs you nothing . . . and may help to turn your problem into a profit. Our nearest sales office can arrange a meeting to suit you.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.
Export Distributor:
Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

Introducing a new series

OIL-WELL PUMPING
PART 1

THIS SERIES on Oil-Well Pumping Methods updates the author's original articles on the subject which were published serially by The Oil and Gas Journal beginning July 1, 1943.

Much has happened in the intervening 17 years in the field of artificial lifting of oil by different methods of pumping. New approaches are being used in the theoretical studies of the subject. Much new equipment has been developed and new applications have been found for the equipment previously used. Some of the methods and equipment discussed in the original series have become obsolete. The series to follow takes cognizance of these facts and will be presented accordingly.

Methods of oil-well pumping divide themselves logically into two groups. To the first group belongs the method in which the pump lowered into the well is actuated from the surface by means of a string of rods. This is sucker-rod pumping. The second group includes those methods in which a prime mover, directly connected to the pump, is lowered into the well as a subsurface unit. The power to the prime mover is supplied from the surface. To this group belong the hydraulic subsurface pump and the submerged, electrical, centrifugal pump. The series will follow this general classification.

As in the case of the original series, the articles will be written from the practical point of view of a user of the pumping equipment. Both surface and subsurface equipment will be considered and methods of equipment selection, application, and use will be discussed. Theoretical aspects of the subject, which belong in the realm of applied research, will be referred to in most general terms only when necessary for better understanding of equipment performance.

The literature on the subject of oil-well pumping is very extensive. One of the features of the original series was a selected bibliography with each installment. This was done to assure proper credit to the source of information and to provide reference for the reader interested in a more detailed study of the subject covered by the installment. The practice will be followed also in this series.

Many of the references given in the original series will be retained although some of them date as far back as 30 years. The fact is, however, that the 15 or 20-year period beginning about 1930 must be considered as the "golden age" of literature and studies on oil-well pumping, particularly sucker-rod pumping. A reader who is interested in the detailed study of the modern aspects of the subject must become familiar with the fundamentals developed during this period.

First – A look behind

BY JOSEPH ZABA

THE PRINCIPLE of lifting a liquid from a well by means of a subsurface pump actuated from the surface by a string of rods and a beam has been known and used for probably over 2,000 years. It has been used for the artificial lifting of oil since the oil industry's inception. During the last 40 years the progress in refinement for sucker-rod pumping installations paralleled the progress in development of tools, equipment, and machinery by other industries. The result is the relatively efficient pumping installation of today. Sucker-rod pumping still retains the dominant position (about 80%) in the field of artificial lifting of oil.

Progress in the method of sucker-rod pumping during this 40-year period, followed three general lines of evolution. First was the effort to improve the mechanical performance of both the surface and the subsurface portions of the pumping mechanism by improvements in the design of equipment and in the materials used. Second, was the study of the basic

Introducing the author

JOSEPH ZABA is chief supervisor of Equipment Engineering, Pan American Petroleum Corp., Tulsa.

Born in Krakow, Poland, he enrolled for 2 years in the department of mechanical engineering at Vienna Institute of Technology, Vienna, Austria. After a year in the department of physics and mathematics at University of Krakow, he enrolled at the Mining Academy of Krakow where he was awarded the degree of mining engineer with petroleum option.

He arrived in the United States in 1924, and entered the graduate school of the University of Pittsburgh where he received his MS in petroleum engineering, in 1925.

He joined Rio Bravo Oil Co. and remained there in different capacities in engineering and operations until 1946. After 2 years in consulting practice, he joined Pan American in his present position.

Zaba has authored several technical articles and papers on drilling and production practice, and is coauthor of Practical Petroleum Engineers' Handbook.

principles underlying and governing the behavior of the sucker-rod pumping system. And third, was the application of the increasing knowledge of the behavior and performance of oil reservoirs in the design and analysis of performance of the pumping systems.

Theoretical Studies

To define the method of approach which will be used in this series toward the question of theory of behavior of sucker-rod pumping, let's look at the evoluation of the theoretical studies.

A sucker-rod pumping installation appears to be a quite simple system and is so considered by many. Actually, its performance is complex and the analysis of its performance is difficult. This is brought about by a number of factors. There exists a strict interdependence of action among the different components of a sucker-rod installation. This obscures and makes difficult to diagnose the action of any one given component.

Some factors affecting the performance of the different parts of the system cannot be rigidly appraised and the role they are playing can not be precisely defined. Different types of loadings are superimposed on each other during each cycle of motion. The rods, the tubing, and the pumped fluid are elastic, elongated columns responding differently to the loads imposed on them. There is a time lag between cause and effect of the actions of the surface and subsurface portions of the pumping mechanism.

The time around 1930 marks the beginning of the intensive theoretical studies of the behavior of the sucker-rod systems. During the following 15 or 20 years investigators like Halan N. Marsh, C. J. Coberly, J. C. Slonneger, Emory N. Kemler, and Kenneth N. Mills, to name only a few, evolved theories pertaining to the motions, forces, loads, stresses, and torques occurring in the sucker-rod systems. From these theories they evolved practical formulas now generally used in calculations of sucker-rod installations.

Paralleling and acting as an aid in these studies were field tests of the pumping wells. During these tests careful measurements were made of all the parameters involved and data thus collected were used for checking the theoretical considerations. A notable example of this approach are the tests performed jointly in 1940 by Phillips Petroleum Co., Westinghouse Electric & Manufacturing Corp., and Sargent Engineering Co. on a well in Oklahoma City field.[1] The pumping mechanism was provided with elaborate surface and subsurface instrumentation. Hundreds of tests were run with different pumping speeds and lengths of stroke, with different types of prime movers and for different sets of counterbalance conditions.

Much was learned. But these tests represented a study of only one well with certain definite producing characteristics and the results could certainly not be generalized. Even then, using the mass of data collected was extremely laborious. Several years later a study was made of these data to investigate the factors involved in determining the peak crankshaft torque from dynamometer cards.

It required the full time of two men for 8 months to study only eight of the many tests performed on the well.[2] Commenting on the economics of this method of approach to the problem, M. H. Halderson points out that under cost conditions prevailing in 1940 these tests involved an expenditure of around $40,000.[3] Other tests on many other wells, particularly on deeper wells, would be needed to obtain data from which generalizations could be attempted. The cost of such an approach would be prohibitive.

Because of these considerations some of the investigators felt that the proper approach is the one used in other fields of engineering; the use of specially designed and built simulators. As early as 1936, Dr. Emory N. Kemler reported on experiments suggested by Dr. Morris Muskat in which an electric analog was used for study of the sucker-rod systems.[4] The voltage in an electrical system is an equivalent of force in a mechanical system. The equation for a long electric transmission line is identical to the equation defining the mechanical behavior of a sucker-rod string. The three electrical circuits used in Kemler's experiments represented the rod, oil, and tubing columns. The experiments indicated that with the analog, studies can be made of rods, oil and tubing motions, and of effects of various factors on pump efficiency and that a load-displacement diagram, that is a dynamometer card, can be obtained.

References

1. H. E. Dralle and E. H. Lamberger, "Oil Well Tests Suggest New Rating Standards," Drilling and Production Practice, API 1941, p. 115.

2. Harold S. Kelly, M. H. Halderson, P. A. Witherspons, and E. S. Calvert, "Factors Affecting the Accuracy of Peak Torque Calculations Using Dynamometer Cards," Drilling and Production Practice, API 1948, p. 160.

3. H. M. Halderson, "Artificial Brain Is Required to Solve the Sucker-Rod Pumping Problem," Drilling and Production Practice, API 1953, p. 210.

4. Emory N. Kemler, "An Investigation of Experimental Methods of Determining Sucker-rod Loads," Petroleum Development and Technology, Petroleum Division, AIME 1936, p. 89.

What's ahead in this series

SINCE the first installment in the Oil Well Pumping series is "A Look Behind," it seems appropriate that we also look ahead . . . ahead to let you, the reader, know what to expect in future installments of this series.

Next week there will appear the first of several articles on sucker-rod systems. These will cover the formula used for calcuation of loads, torque, counterbalancing, etc., dynamometers and cards, counterbalancing principles, and geometry effects.

The sections that follow on sucker rods will cover properties, working stresses, makeup torque, failures, corrosion fatigue, and string design.

This will be followed by several installments on the sucker-rod pump itself; plunger travel, displacement, efficiency, pump types, special pumps, etc.

Surface pumping equipment will be treated in about 10 separate installments. All types of equipment, from beam-balanced units to long-stroke hydraulics, will be covered. Prime movers are not forgotten, either, for there will be a lot of valuable information on internal-combustion engines and electric motors. Characteristics, and the basis for selection, will be included so that you will be able to design your own installation for maximum economy and efficiency.

Rodless pumping comes next. Series will include exhaustive treatment of the various systems and types, as well as examples of design calculations.

Miscellaneous subjects, such as well servicing, paraffin removal and control, and corrosion problems will round out the series and bring it to a close about this time next year.

and they run
and they run
and they run

1903—
Indianapolis.
a trolley car.
a rolling adventure surrounded by noise.
pennies, nickels, children . . .

and inside—
a Fairbanks Morse electric motor.
it drove the trolley over thousands of miles
and rode with it
into glorious retirement.

pick a year—
from the turn of the century until now.
pick a month,
pick a day,
pick a city,
pick a town—
our motors are in its history . . .
pulsing, driving, working.
powering the things we need
and the things we want.
pushing our daily advances.
pulling us into the future.

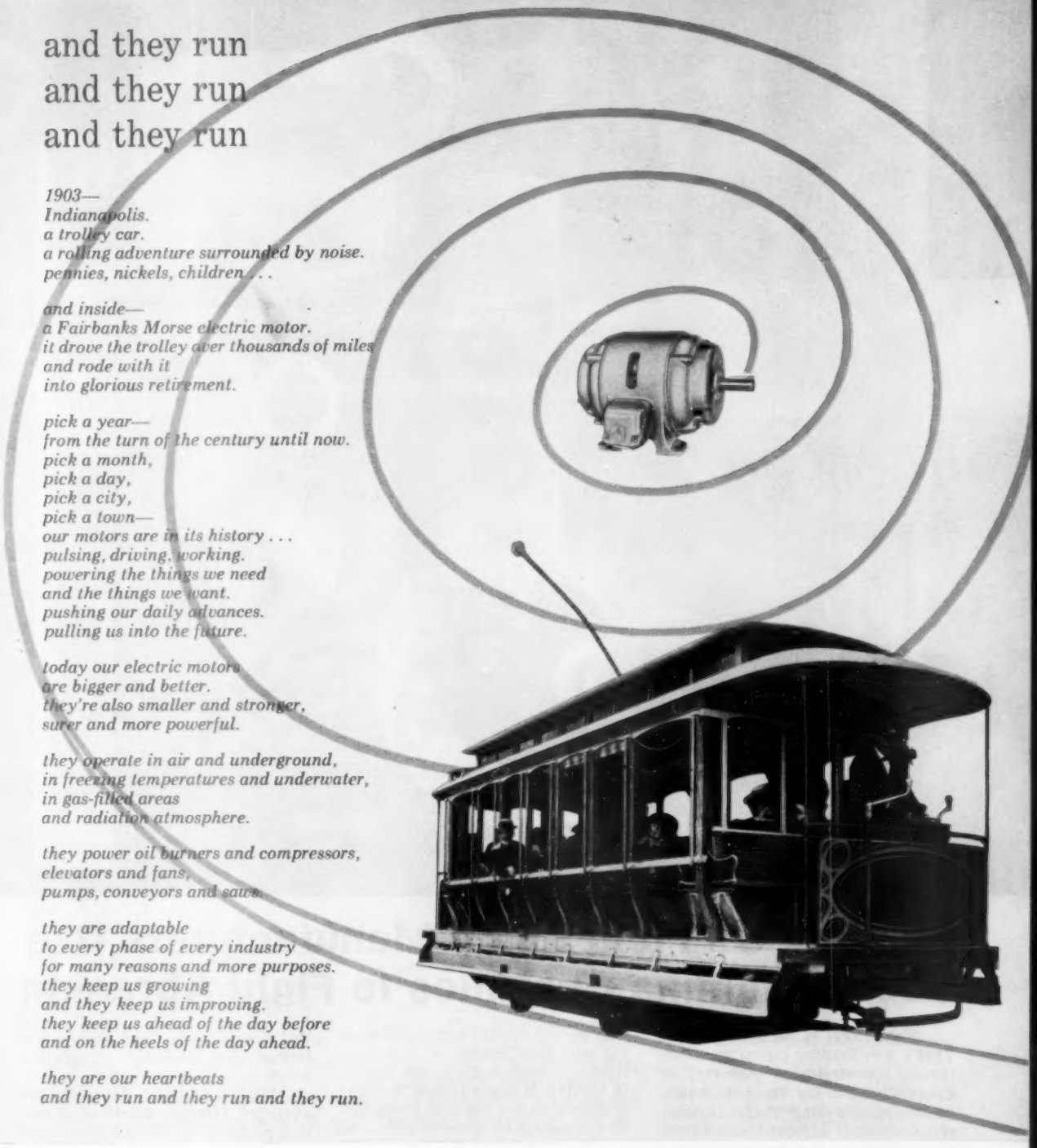
today our electric motors
are bigger and better.
they're also smaller and stronger,
surer and more powerful.

they operate in air and underground,
in freezing temperatures and underwater,
in gas-filled areas
and radiation atmosphere.

they power oil burners and compressors,
elevators and fans,
pumps, conveyors and saws.

they are adaptable
to every phase of every industry
for many reasons and more purposes.
they keep us growing
and they keep us improving.
they keep us ahead of the day before
and on the heels of the day ahead.

they are our heartbeats
and they run and they run and they run.

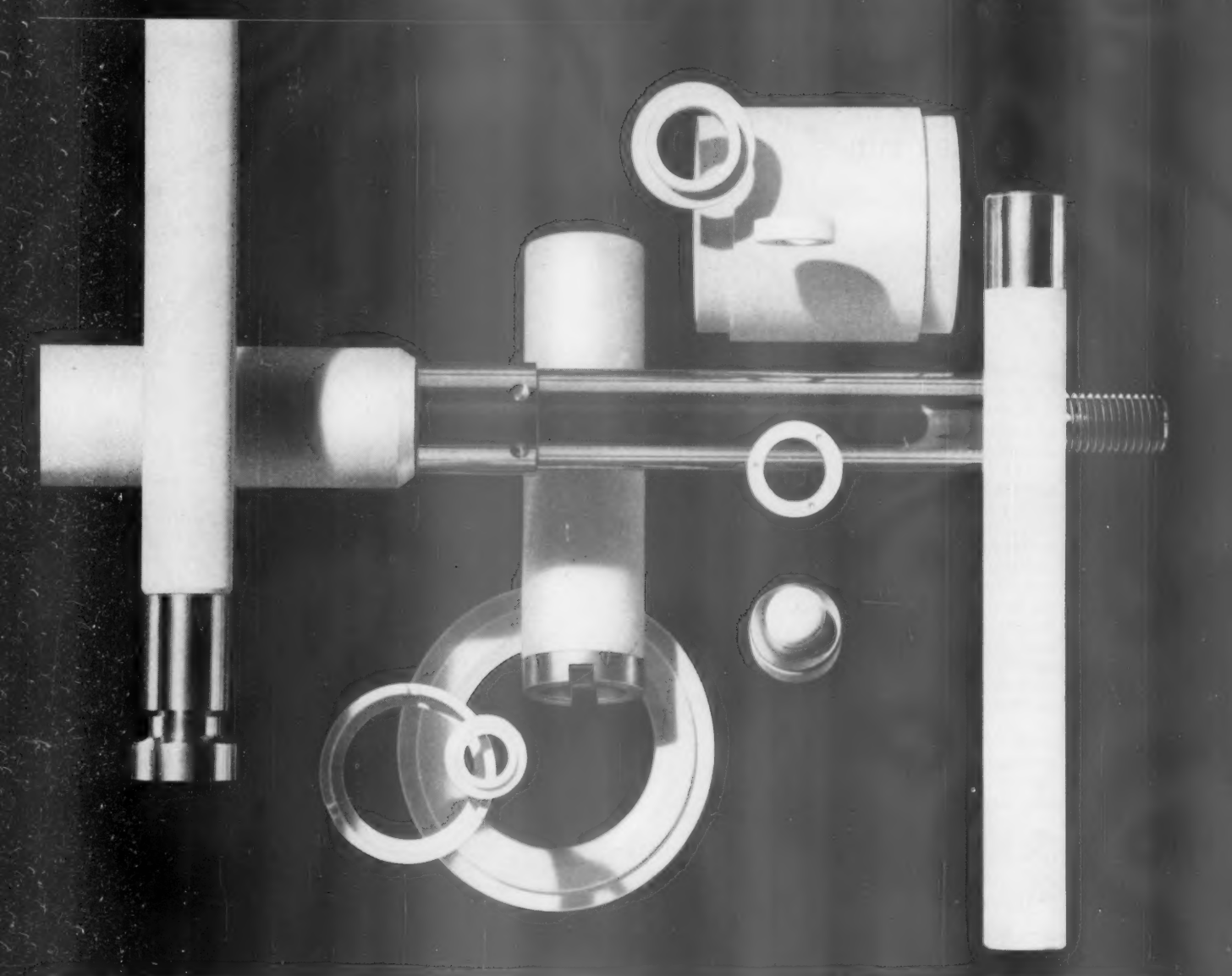


Fairbanks, Morse

A MAJOR INDUSTRIAL COMPONENT OF **FAIRBANKS WHITNEY CORPORATION**

The electric motor is one of the most versatile sources of power ever developed. It is economical, practical and time-resistant. Fairbanks-Morse electric motors can turn out ½ horsepower or 10,000 horsepower, meet every known job demand within this range or be custom-specified to your blue-print projections. Whatever your production needs or plans may be, our electric motors can power them.

If you are in a field where power for production must be efficient, effective and dependable—we suggest that you consider our great variety of electric motors. For further information please write to: Mr. George H. Herrick, Vice President and General Manager, Electrical Division, Fairbanks, Morse & Co., Freeport, Illinois.



Leading Oil Field Pump Manufacturers Use Coors Alumina Ceramics to Fight Abrasion

Waterflood is hard on pumps! That's why leading pump manufacturers are supplying plungers of Coors Ceramic for their multiplex pumps. Users find these ceramic plungers wear several times longer than plungers of expensive metals.

Coors Alumina Ceramics are extremely hard — equal to a sapphire in hardness. This property makes the plungers very resistant to abrasion, plungers do not easily score nor wear down in the areas contacting the packing. The very smooth surface finish is maintained over a long period, greatly increasing packing life. The ceramic is chemically inert — it does not corrode nor pit in service. It has a tensile strength of 17,000-18,000 PSI and a compressive strength of over 240,000 PSI.

Manufacturers of positive displacement metering and proportioning pumps find plungers of Coors Alumina Ceramics give long, accurate service — because of its hardness and abrasion resistance, and its chemical inertness.

Coors Alumina Ceramics are also used in rock bit nozzles, chokes, ball check valves, and sleeve protectors for multiple completion wells.

Chokes of Coors Ceramics are available through oil field stores. Pump plungers and other ceramic parts are available only through the equipment manufacturers. Coors does not supply direct, but we will be glad to give you names of all manufacturers using our ceramic in their equipment. If you are having abrasion or corrosion problems, ask your equipment manufacturer about Coors Alumina Ceramics!

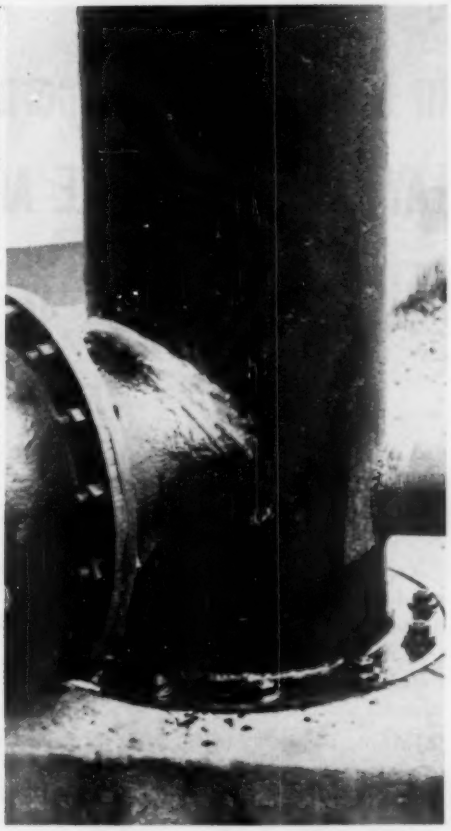
Coors **Alumina Ceramics**

COORS PORCELAIN COMPANY • 600 NINTH STREET, GOLDEN, COLORADO

FIG. 1

SALT-WATER return line developed a leak through the joint weld and duroline lining. Line serves three plants, and couldn't be shut down easily, so . . .

FIG. 2



. . . an isopolyester resin compound was packed around a redwood plug and held in place until it hardened, showing how . . .

Isopolyesters can cut maintenance costs

ISOPHTHALIC polyester resins are being successfully used in some cases to reduce maintenance costs at the Richmond, Calif., refinery of Standard Oil Co. of California. The plastic compound is used not only to plug leaks, but it also is applied as an inner coating to pumps and valves before they are installed.

Here are some examples:

. . . A wax deoiler tube failed because of extensive corrosion. The corroded areas were sandblasted in place, and the pits and holes were filled with an isopolyester caulking compound. When this had cured, the pipe was wrapped with 4-in. glass-fiber tape and coated with liquid resin. This and three other tubes repaired in the same manner have been operating for a year at 140° F.

. . . A salt-water return line developed a leak at the joint (Fig. 1). Since this line connects the water systems of three plants, shutting it down would have caused considerable loss in down time.

A redwood plug, shaped to fit the hole, was driven into the gap, cutting off most of the flow. The caulking compound (Flex Bond) was prepared for a fast cure and applied tightly around the hole. It was held in place, and despite the water pressure it hardened, completely filling the gap.

After the adjoining area had been dried and wire-brushed, several layers of glass fiber cloth, impregnated with isopolyester resin (WetWeld), were applied over the plug and around the joint. Complete repairs were effected without turning off the water pressure (Fig. 2). Cost of labor and material was $150.

. . . Smaller jobs can save money too. A cast-iron bearing case, cracked under operating tension, was repaired with patching compound and liquid resin. Replacement would have cost $400. Plastic repair cost $105.

The webbing and seat of a butterfly valve used in salt-water service were corroded. A new butterfly was made with fly screen and isopolyester patching compound. A new valve would have cost $600. Repair cost $60. The valve has been in operation for a year.

Preventive maintenance. It's now standard practice at the refinery to inner coat new valves and pumps before installation; a fairly thick coat can be applied without sagging. The equipment so treated has caused none of the corrosion problems encountered before.

The plastics have been successfully tested as an inside coating for tanks which contain caustic chemicals. And tests are under way for use as an outside coating for tanks and buildings, outside coating of tankers, as well as the coating of concrete floors in warehouses and laboratories.

In temporary, semi-permanent, permanent service . . .

LAY MORE PORTABLE AIR, GAS, WATER LINES FASTER WITH REPUBLIC ELECTRUNITE GROOVED-END TUBING

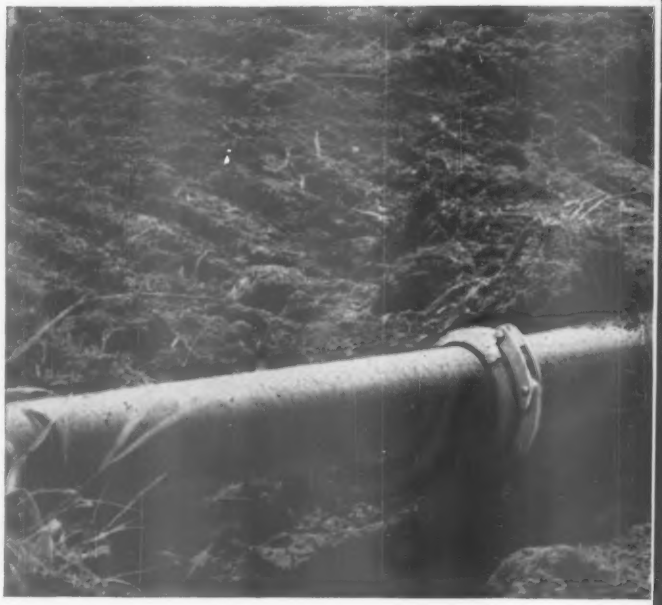
Cut operation time and keep ahead of the job. In-the-field piping systems made up of Republic ELECTRUNITE® Lightweight Grooved-End Tubing solve fluid, gas, and air handling problems fast!

Republic's Grooved-End Tubing is engineered and produced to meet severe requirements and laying conditions of road building contractors, the mining, petroleum, construction, tank truck, and processing industries. Save installation time, dismantling time, over-all labor costs.

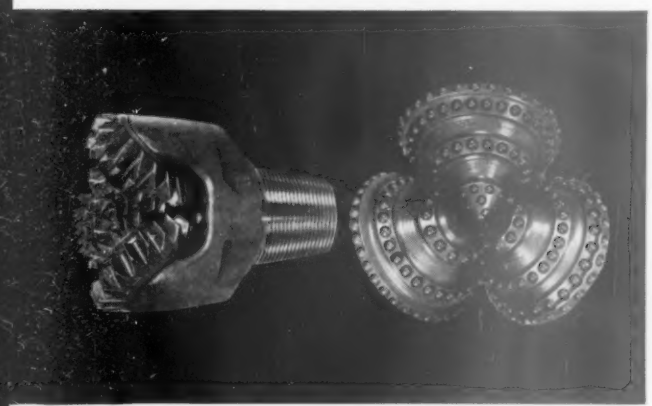
Joining is quick and easy. No threads to cut, no runs to turn. Simply use any of a variety of available fittings and couplings to make up a complete system. Lightweight, portable grooving tools are available for field-forming grooves on field-cut tubing.

Ideal for temporary, semi-permanent, permanent service. It can be used again and again—re-laid as the job moves ahead. When work is completed, simply dismantle and move to the new job site.

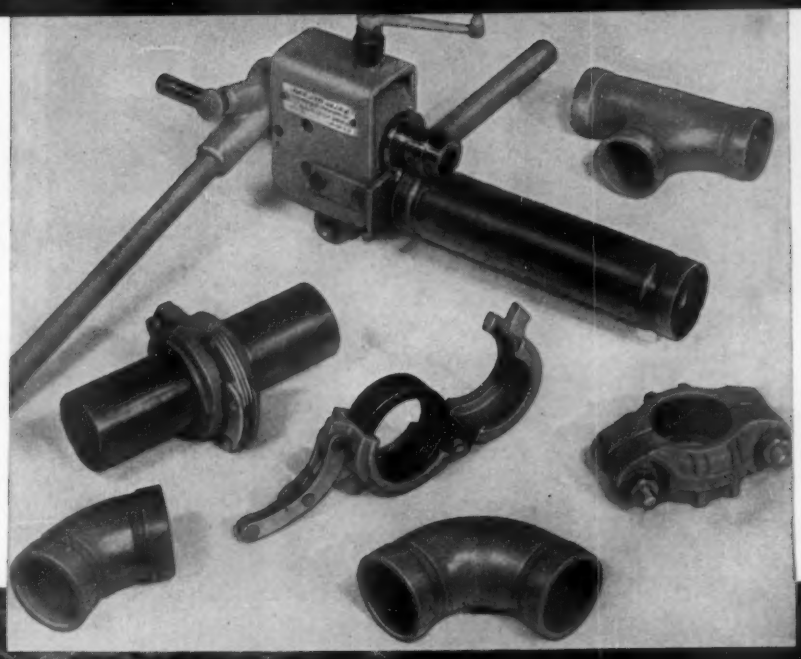
For additional information, price, delivery . . . call or write your Republic representative. Use coupon below.



REPUBLIC ALLOY STEELS resist wear and abrasion, are tough and durable, with exceptionally high strength-to-weight ratios without sacrifice of safety. That is why Republic Alloy Steels are used for gears, shafts, bearings, tools, and other equipment like these diamond-sharp drilling bits. Write for data.



REPUBLIC SRK PLASTIC PIPE saves R. S. Anderson Oil Company thousands of dollars in flow lines and salt water disposal systems. In lines previously replaced every six to eight months, SRK is still in service. No corrosion, no evidence of chemical action, and with savings already estimated at 50%. Write for details.



IN-THE-FIELD OPERATORS like Republic ELECTRUNITE Grooved-End Tubing because it is uniformly round. Each length fits the other for fast make-up. Joining is quick and easy. Simply use any of a variety of available fittings and couplings to make up a complete system. Lightweight, portable grooving tools are available for field grooving field-cut tubing.

EASY WORKABILITY is a characteristic of Republic Continuous Butt Weld Pipe. Uniform strength and ductility assure fast, trouble-free threading—excellent in-service dependability. Tight galvanized coating resists corrosion. Sizes from ⅛″ through 4″ nominal. Available in double random lengths. Write today.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. OG-9136-A
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send more information on the following products:

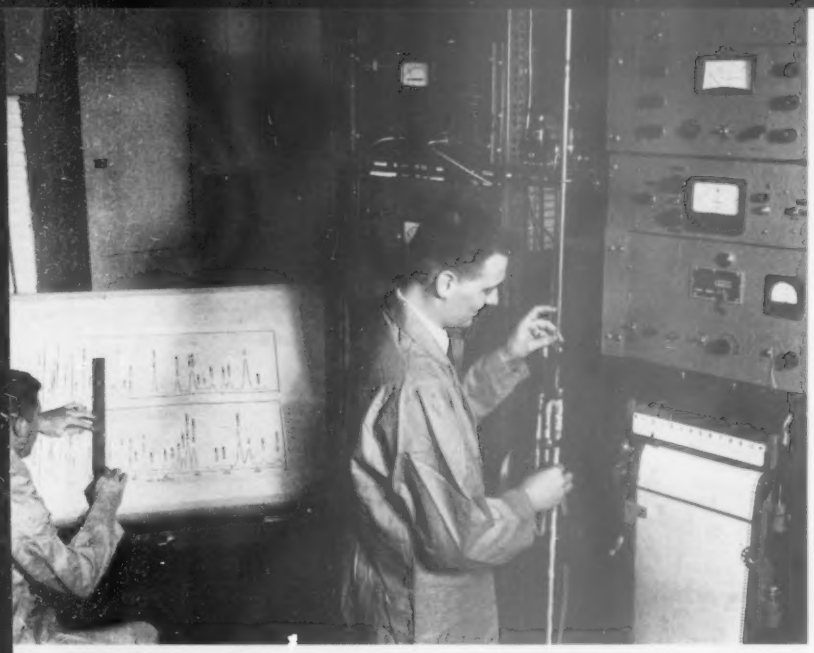
- ☐ Republic ELECTRUNITE Lightweight Grooved-End Tubing
- ☐ Alloy Steels ☐ Republic SRK® Plastic Pipe
- ☐ Republic Continuous Butt Weld Steel Pipe

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____



RESEARCH CHEMIST adds a drop of sample to the top of the gas-chromatographic prefractionating column, while technician measures peaks of a chromatogram to calculate results.

Chromatography works fast

. . . *in showing up differences in crudes*

CRUDES DIFFER in more ways than you may think. Total naphtha and sulfur aren't the only important differences; distribution of hydrocarbon isomers can also mean a lot to the refiner in selecting his crude. Until recently, however, he couldn't afford to get information of this kind because of the time and expense required. Now, researchers at Standard Oil Co. (Indiana) have applied new methods of gas chromatography to accurately analyze the light-naphtha fraction of crude in hours instead of months, and at low cost.

Some of our results, shown in Table 1, reveal how crudes differ—not only in total amount of light naphtha, but in the composition of this fraction. Differences show up among crudes from different locations and among crudes at the same location but at different depths. Beaver Lodge Silurian is predominantly normal paraffinic; Winkler Permian is mainly branched paraffinic; Lee - Harrison Permian is highly aromatic; and South Houston Tertiary is mainly cycloparaffinic.

Naphthas from some crudes are better than others as feeds for different refining processes. Beaver Lodge naphtha, for example, would be a better feed for paraffin isomerization than would Winkler naphtha. Similarly, South Houston naphtha would be best for catalytic reforming.

. . . **With older methods,** obtaining details of isomer distribution required impractically long operations, with resulting high cost. Analyzing the C_1-through-C_5 fraction alone took many hours by distillation. Worse, determining isomers in the light-naphtha fraction took months of laborious distillation, spectroscopy, and other analytical techniques. The classical work on petroleum analysis by Dr. Frederick D. Rossini and API research Project 6 showed what could be done with a single crude when good equipment and traditional methods were used intensively[1]. They also found that naphthas from different crudes contain nearly all of the saturated hydrocarbons and aromatics, and that the main differences are the relative amounts of each.

. . . **With gas chromatography,** the same kind of information on the light-naphtha fraction (ethane through heptane) can be had in hours. By applying some of our own advances in methods and instrumentation, we found and measured all of the 35 hydrocarbons believed to occur in the fraction. Some hydrocarbons were measured in concentrations as low as 0.002% and others as high as 2.5% of total crude. Two of the hydrocarbons we found were not known before to exist in crude.

The savings in cost and time come from three sources. The equipment is inexpensive—especially when compared with most modern analytical instruments. Nonprofesisonal workers can perform the analyses. Much less time is needed per analysis. One man can completely analyze the light-naphtha fraction and calculate the results in 12 hours.

How the Method Works

The new method is based on separating light naphtha from the crude in a gas-chromatographic prefractionating column, separating the naphtha components in three gas-chromatographic analyzing columns, and measuring separated components with an accurate detector as they leave each column.

The prefractionating column separates the C_2-through-C_7 components, in order of boiling point, from the rest of the crude. It is packed with an inert support, firebrick, coated with a selective solvent, Apiezon L grease. About 0.05 ml. of crude, diluted with tetralin to make it flow more freely, is injected into the top of the column. Compounds through C_7 are carried into the analyzer column with nitrogen. The prefractionating column is prepared for reuse by flowing nitrogen backwards to push the heavy components, which remain in the column, out at the top.

Three analyzing columns, packed

BY JOHN C. WINTERS

. . . group leader in analytical research at the Whiting research laboratories of Standard Oil Co. (Indiana). Since he joined Standard in 1950, he has specialized in such separation processes as chromatography, distillation, adsorption, and thermal diffusion. He obtained his master's degree in chemistry at Kansas State College.

ORBIT VALVES®

WHERE CONTINUOUS HEAVY DUTY SERVICE IS ESSENTIAL.....

ORBIT FORGED STEEL PRODUCTION VALVES

Orbit Forged Steel Production Valves in Service on Manifold for Gas Unit Near Freer, Texas. Gas from 20 wells is being fed into Hydrocarbon Recovery Unit.

Orbit Valves shown here are installed on continuous heavy duty service. Orbit Forged Steel Production Valves are so designed that seats contact only at closure. Dust and abrasives carried by gas from wells cannot get between seats because valve is self-cleaning and dust carryover is swept through valve by gas stream. There are no voids or cavities in the Orbit Valve for gases or fluids to become trapped in — when the valve is either in an open or closed position.

ORBIT VALVE COMPANY

P. O. BOX 699 TULSA, OKLAHOMA, U.S.A.

TABLE 1—GAS-CHROMATOGRAPHIC ANALYSES OF CRUDE OILS

(Weight per cent)

Hydrocarbon—	Beaver Lodge Silurian	Winkler Permian	Lee-Harrison Permian	South Houston Tertiary
Ethane	0.04	0.02	0.03	0.004
Propane	0.37	0.053	0.21	0.040
Isobutane	0.31	0.050	0.19	0.039
n-Butane	1.02	0.20	0.58	0.090
2,2-Dimethylpropane	0.004	0.002	0.005	0.002
Isopentane	0.99	0.35	0.86	0.110
n-Pentane	1.58	0.20	0.78	0.118
Cyclopentane	0.13	0.048	0.11	0.033
2,2-Dimethylbutane	0.018	0.028	0.007	0.022
2,3-Dimethylbutane	0.12	0.078	0.16	0.040
2-Methylpentane	0.79	0.28	0.64	0.096
3-Methylpentane	0.45	0.41	0.49	0.070
n-Hexane	2.03	0.23	0.78	0.110
Methylcyclopentane	0.57	0.29	0.51	0.21
2,2-Dimethylpentane	0.031	0.014	0.008	0.016
Benzene	0.25	0.014	1.01	0.037
2,4-Dimethylpentane	0.068	0.044	0.019	0.025
Cyclohexane	0.59	0.24	0.76	0.32
2,2,3-Trimethylbutane	0.006	0.004	0.002	0.007
3,3-Dimethylpentane	0.018	0.023	0.005	0.014
1,1-Dimethylcyclopentane	0.059	0.081	0.023	0.032
2,3-Dimethylpentane	0.15	0.20	0.19	0.048
2-Methylhexane	0.47	0.27	0.30	0.048
1-cis-3-Dimethylcyclopentane	0.11	0.18	0.10	0.056
1-trans-3-Dimethylcyclopentane	0.10	0.18	0.08	0.049
3-Methylhexane	0.49	0.48	0.38	0.080
1-trans-2-Dimethylcyclopentane	0.18	0.17	0.14	0.081
3-Ethylpentane	0.04	0.06	0.06	0.009
n-Heptane	2.32	0.26	0.68	0.078
2,2,4-Trimethylpentane	0.00	0.008	0.005	0.008
1-cis-2-Dimethylcyclopentane	0.0	0.08	0.03	0.02
Methylcyclohexane	1.45	0.48	0.83	0.78
Ethylcyclopentane	0.06	0.09	0.08	0.04
1,1,3-Trimethylcyclopentane	0.06	0.14	0.01	0.027
Toluene	0.76	0.093	0.97	0.104
Total light-naphtha fraction	15.63	5.35	11.03	2.86

with firebrick coated with carefully selected liquids[2], are needed because no known single packing will separate all isomers.

A combination of results from two columns, 26 and 40 ft. long, determines the C_2-through-C_7 saturated hydrocarbons and benzene. Column packings are chosen so that naphthenes tend to be retained longer than paraffins. This selectivity varies so much with the ratio of liquid coating to inert support that exactly the optimum ratio must be used to get the right combination of separations[2].

The third column, 10 ft. long, determines toluene.

As each component is carried by nitrogen from the column, it is measured by a gas-density detector of new design. This detector was developed in our laboratories to permit accurate analyses across a broad range of compositions. It alone gives an output directly proportional to the amount of gas present, so that calibration is not needed. Gas-density detectors have not been commercially available, but instruments of our new design will be on the market soon.

Carrying out all separations, transfers, and analyses in a single closed system is vital to reliability of the method. Accuracy, as checked with synthetic mixtures, is within 2% of the amount of most components.

Getting results from the data is straightforward.

Every compound appears as a peak recorded at a known point—determined from pure compounds—on the chromatogram traced by the gas-density detector. All but four of the compounds boiling below 227° F. are determined directly from known individual peaks.

Peaks for the remaining four, however, appear at the same positions as those for other compounds. Differentiation is possible because the other compounds give individual peaks on another column. The difference between the two peaks represents the compound being determined.

Future Developments

Complete analyses of total naphtha should result from several recent instrument developments: capillary columns with hundreds of thousands of theoretical plates; programed heating of the columns, in which the temperature of the column is steadily increased during analysis; and hydrogen-flame ionization detectors.

The new capillary columns improve separations so much that separating all isomers in a single column may be possible. Programed heating increases the range of compounds that can be separated, because low-boiling and high-boiling compounds pass through at the best temperature for complete separation. The new ionization detector is suited to analysis with programed heating because it is not sensitive to changes in temperature and rate of flow of gases caused by the heating.

The rapid accumulation of accurate composition data will probably be useful soonest in studies of the origin of crude and in exploration. At Standard, data have been correlated from detailed analyses of 20 crudes representing extremes of composition from the major producing areas of the world[2].

The data show an interrelationship of composition, geological age, and underground history of the crudes. Crudes older than 175 million years vary more in composition than do more-recent crudes. Younger crudes, particularly those with similar underground histories, seem to have similar compositions.

Much more work in this field is needed. For example, careful study of a reservoir should show whether the oil it contains comes from one source or more than one. Adsorption effects during migration should be discernible in analyses of properly selected samples from a well-defined stratum. Because minute samples suffice for analysis, migration experiments could be simulated in the laboratory on a greatly reduced scale.

In evaluating crudes for refining, the increasing complexity of refining methods will require more sophisticated ways of differentiating crudes than gravity, total naphtha content, or sulfur content. The importance of differences in hydrocarbon structure has already dictated processes like isomerization and catalytic reforming. As the trend toward preparing individual compounds from refinery stocks continues, gas chromatography is bound to become an essential tool for the refiner who wants the best raw material for his particular need.

References

1. Rossini, F. D., and Mair, B. J., "The Work of the API Research Project 6 on the Composition of Petroleum," Proceedings, Fifth World Petroleum Congress, Section V, 1959, New York.

2. Martin, R. L., and Winters, J. C., "Composition of Crude Oil Through Seven Carbons as Determined by Gas Chromatography," Analytical Chemistry, 31, 1954 (1959).

ROTARY OR CENTRIFUGAL

...Which one is best for your application?

Rotary or centrifugal? Sometimes the choice is easy. For example, you would use a rotary pump for very viscous liquids (over 2500 s.s.u.). Or where poor suction conditions exist. Or when positive displacement is required. Centrifugal pumps would be used for extremely corrosive or abrasive liquids, low viscosity liquids (under 2500 s.s.u.) water, slurries, or petroleum products.

But . . . in many applications combinations of these factors exist. Or the liquid you want to pump is not clearly in either area. Then there are other considerations such as initial cost, operating cost, lubrication value of the liquid, location and even budget limitations.

All of these considerations can put you in the middle—where either a rotary or centrifugal can be used. The best choice can only be made by someone with experience and knowledge of both types.

As one of the few manufacturers of a complete line of both rotary and centrifugal pumps, Worthington can help you select the best, most economical solution to this perennial pump problem. For the name and address of your nearest Worthington representative, consult the yellow pages.

P.S. If you'd like a copy of a 50-page booklet, "Rotary and Centrifugal Pumps: Theory and Design," please write to Worthington Corporation, Section 20-14, Harrison, New Jersey, for bulletin G-2666.

WORTHINGTON

272 JACKS & PULLERS / SIMPLEX

to choose from!

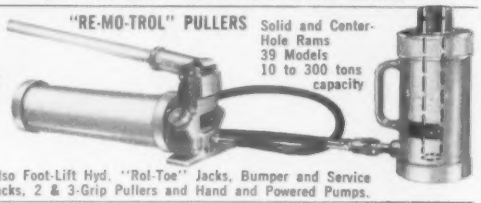
THE WORLD'S MOST COMPLETE LINE

81 Hydraulic Jacks & Pullers

STANDARD HYDRAULIC JACKS
11 Models
1½ to 100 tons capacity
5¼" to 22" travel

"JENNY" CENTER-HOLE HYDRAULIC PULLERS
6 Models
30 to 100 tons capacity
3¼" to 10" travel

"RE-MO-TROL" PULLERS Solid and Center-Hole Rams
39 Models
10 to 300 tons capacity



Also Foot-Lift Hyd. "Rol-Toe" Jacks, Bumper and Service Jacks, 2 & 3-Grip Pullers and Hand and Powered Pumps.

45 Lever Jacks

Also Pole-Pulling, Reel, Timber, Cable & Wire Tensioning, Pipe Pushing & Pulling, Tie Remover, Tie Replacer, and Siding & Flooring Jacks.

SINGLE ACTING RATCHET LOWERING
11 Models, 5 to 20 tons capacity. Full capacity on toe or cap.

GEARED JACKS
3 Models, 25 to 35 tons capacity. Side toe lift.

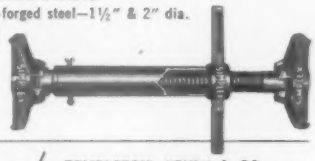
TRACK (TRIP) JACKS
13 Models (Five aluminum alloy) Single and double acting.

146 Screw Jacks

SCREW JACKS 4-WAY HEAD — 19 MODELS
10 to 24 tons capacity. Ball bearing, Malleable Housing, Safety peep hole.

JOURNAL JACKS 8 MODELS
15 to 50 tons capacity. Powerful, light, low height.

TRENCH & TIMBER BRACES
22 Models. Drop-forged steel—1½" & 2" dia. screws. Adapt to any width of trench.



Other screws types. Ratchet Head Planer and Reel Jacks; Push-Pull and Shoring Jacks; Steamboat Ratchets & Load Binders; Mine Roof and Timber Jacks, Rail Puller & Expander, and Gear & Wheel Pullers, Bumper Jacks.

For Complete information write for:
Mechanical Jacks: Catalog Mech. 60 / Hydraulic Jacks: Catalog Hyd. 59

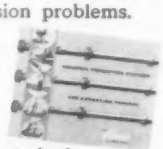
TEMPLETON, KENLY & CO.
2539 Gardner Road
Broadview, Illinois

A. C. TEMPLETON, 5627 Del Roy Drive, Dallas, Texas

*HARCO CATHODIC PROTECTION

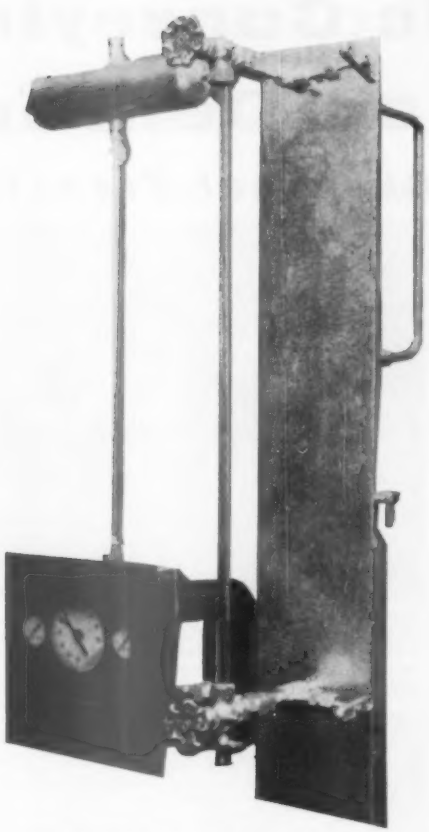
Let Harco take your corrosion cares away with H.C.P. . . . a scientific approach to electrolytic corrosion in buried and submerged structures . . . *that actually pays for itself!* Competent Harco engineers conduct field surveys, analyze your cathodic protection needs, design complete systems. Harco also provides you with a single source for all your requirements . . . supplies materials, installation, inspection and maintenance services, as desired. Write us today about your specific corrosion problems.

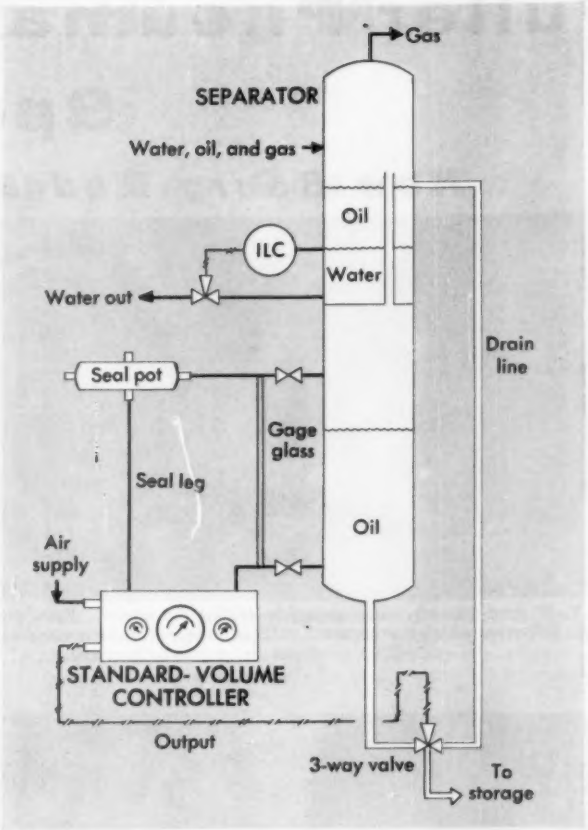
Harco



Send for your Harco catalog *today!*

THE HARCO CORPORATION
4594 East 71st Street • VUkan 3-8787 • Cleveland 25, Ohio





SIMPLE AND ACCURATE is new LACT setup for automatic temperature compensation in volume measurement.

New standard-volume controller offers promise in LACT units

BY G. L. FARRAR
Engineering Editor

A NEW MEASURING SETUP enables an oil-field metering separator to dump a temperature-compensated (standard) volume every time, regardless of variations in oil gravity and temperature.

A differential-pressure pneumatic controller is used in the application. One leg of the pressure comparator is filled with a seal liquid, as shown in the accompanying diagram. This seal liquid may or may not be the oil which is being metered. The other leg, the separator gage glass, fills with oil as the separator fills. When the weights of the two liquid legs are equal, the separator is dumped.

This means that a constant weight of liquid is dumped from the separator each time the three-way valve moves to the dump position. Thus, there is no need for later temperature and gravity-compensation calculations.

How it works. Water, oil, and gas from the lease come into the upper part of the separator. The gas is taken overhead, while water and oil collect on the plate which divides the separator into two parts. Water takeoff is regulated by an interface-level controller. During the separator-fill part of the cycle, oil flows through drain line, through three-way valve, and into the lower part of the separator.

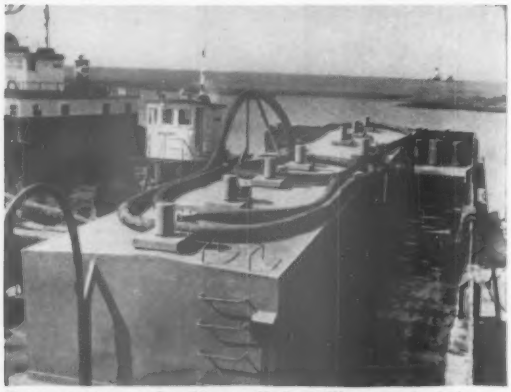
When oil level has reached a certain point, as determined by comparing weight of oil in the gage glass with weight of liquid in the seal pot, the standard-volume controller positions the three-way valve so that the separator is dumped to storage or pipeline. When the liquid level in the separator has fallen to a given low point, the controller positions the three-way valve to the fill position, and the cycle is complete.

The scheme for standard-volume control was devised by Barton Instrument Co. The accompanying photograph showing how the installation might look on a separator was provided by Roy K. Bliler, Snyder Co., Inc., Houston.

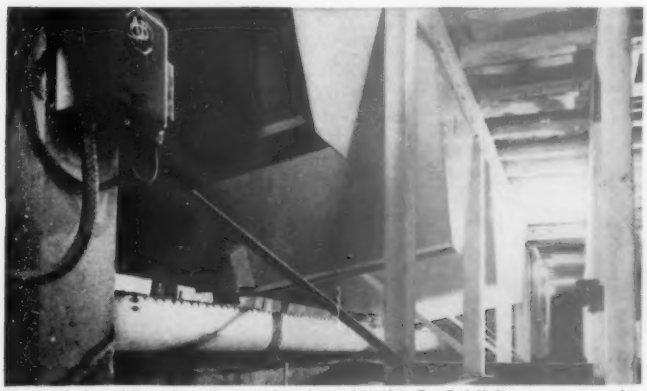
Fuller Pneumatic Conveying Speed Delivery,

How Bourg Mud & Chemical Transfers

"C.T. 8" mud-delivery barge alongside drilling rig tender. Fast, pneumatic deliveries in high seas are made without danger to crews or equipment.

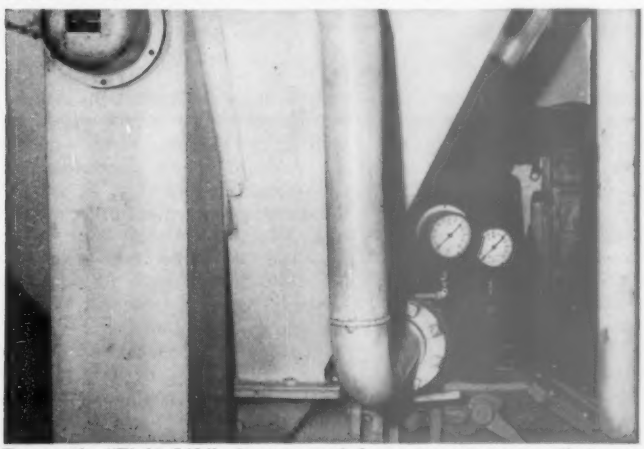


Superstructure of self-propelled drilling mud delivery barge, the "C.T. 8". Flexible hose, through which mud is pumped to rig storage bins at 50 tons an hour, rests atop enclosed Airslide bins. Pneumatic, bulk delivery system replaces cargo net, labor crew, costly bag handling.



Four of the eight bins discharging into Airslide® fluidizing conveyors in hold of "C.T. 8". These are discharged individually into a screw conveyor, as part of high-speed, automatic mud-delivery system.

Opening discharge gate at Airslide bin outlet, sending flow of dry drilling mud into screw conveyor.



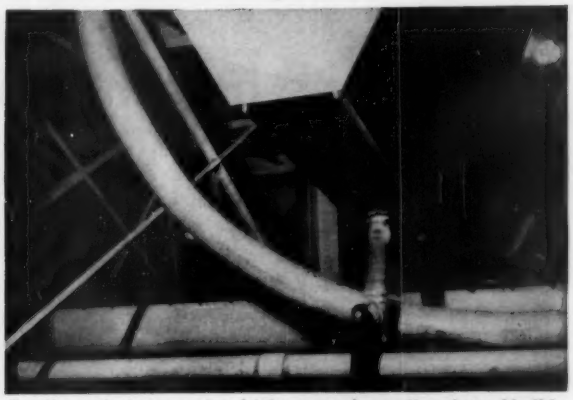
Pneumatic "Fluid Lift" elevates mud from screw conveyor discharge point into a receiving hopper—from which mud is pumped aboard rig.

Bottom of receiving hopper, showing 6" Type "H" Fuller-Kinyon pump for pneumatically conveying barite. (Drive clutch in foreground.)

Systems for Drilling Mud Cut Labor Costs

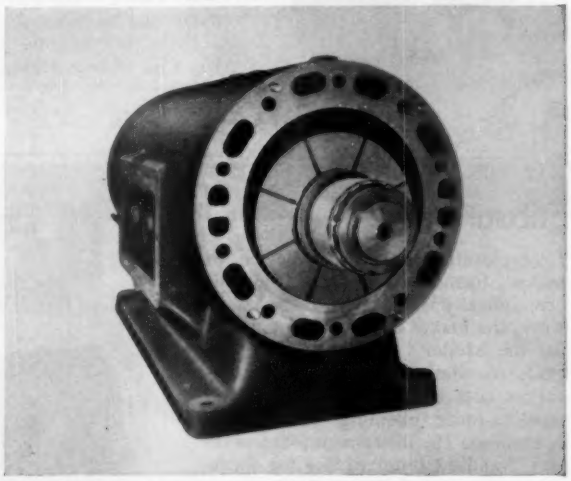
50 Tons an Hour In Two-Man Operation

Rugged, trouble-free Fuller Single-Stage Rotary Air Compressor, located amidships, supplies all air for pneumatic conveying operations.



Small, vertical connection (right, center) supplies air to Airslide fluidizing conveyor along bottom of receiving hopper. This unit causes mud to flow by gravity into Fuller-Kinyon pump.

Mud-storage terminal adjoins dock. Fuller pneumatic conveying systems automatically move mud to weighing scale and then to either bulk cans or into bins of "C.T. 8" delivery barge. On both offshore and land-based rigs handling mud or cement, Fuller equipment offers time-tested advantages.



The Fuller Rotary Compressor—widely known in the petroleum industry for a variety of in-plant and gas-gathering applications. Advantages of the rotary include pulse-free compression, absence of vibration, low-power needs and reduction of maintenance. Available in capacities to 3300 cfm.

1321
G-205T

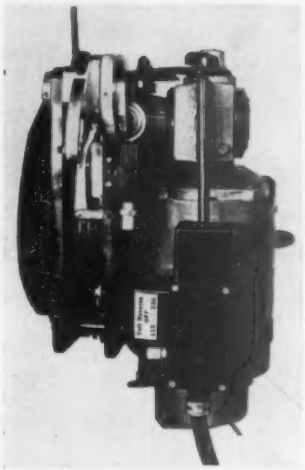
FULLER COMPANY GENERAL AMERICAN TRADE MARK

FULLER COMPANY
132 Bridge St., Catasauqua, Pa.
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION
Offices in Principal Cities Throughout the World

Fuller
pioneers in harnessing AIR

This week's SHOWCASE features . . .

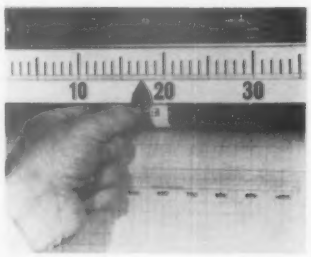
Swing-stage hoisting unit



. . . now on the market, the Electairlift, can be adapted to scaffolding, climber basket, or bosun's-chair operation. Four models are made. Two are electric-powered, one is pneumatic-operated, and the other is hand-operated. The hand and air-powered models have a capacity of 1,000 lb. The electric models, which can be adapted to either 115 or 230-volt power by the turn of a switch, have a 600-lb. capacity with a ½-hp. motor or a 900-lb. capacity with a ¾-hp. motor. The pneumatic and electric models can be raised or lowered at the rate of 18 ft. per minute. Source: **Ohio Hoist Mfg. Co., Lisbon, Ohio.**

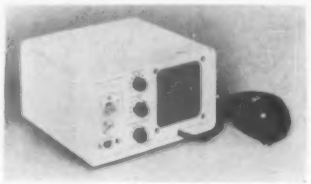
Subsurface

. . . exploration tool recently developed makes formerly expensive methods economically feasible for shallow work, the maker claims. Potential uses for the Model 117 seismic timer include foundation investigations, excavation cost estimating, highway and pipeline-route planning, and similar operations. The instrument features direct, totalized time reading for measuring hammer-induced shock-wave velocities in soils. It allows shallow exploration of earth structures to depths of 50 ft. without drilling. The timer measures 7 by 7 by 11 in. and weighs 12 lb. Source: **Dynametric, Inc., 2955 East Colorado Boulevard, Pasadena, Calif.**



Multipoint

. . . strip-chart recorder tradenamed the Model 15 Electronik, can be easily converted to change the number of points being measured, the actuation, or the range. It is designed for application in laboratories and in industrial processes where frequent record-changing is required or where it may be desirable to change the type of primary element or range of measurement. Source: **Brown Instrument Div., Minneapolis-Honeywell Regulator Co., Wayne and Windrim Avenues, Philadelphia 44.**



Mobile radiotelephone

. . . for citizens band now being offered promises to be an economical means of communication to help cut operating costs, improve efficiency, and coordinate worker activity. The D-Phone is a 5-watt mobile unit for operation on any two of the 23 available channels in the 26.96 to 27.33 Mc. frequency band. It is available for either 12-volt d.c. or 117-volt a.c. operation. With average operating conditions, the maker says the effective range is between 5 and 10 miles. The radiotelephone is a dual-channel unit with crystals on both transmit and receive. It measures 8¾ by 5 by 8 in. and weighs 10 lb. Source: **Kaar Engineering Corp., 2995 Middlefield Road, Palo Alto, Calif.**

Want more facts about equipment or copies of product literature described in this issue?

Send this **Showcase Coupon**

to manufacturer at address shown in bold type after each item.

Product name, Model no., literature title or number: .....

.....

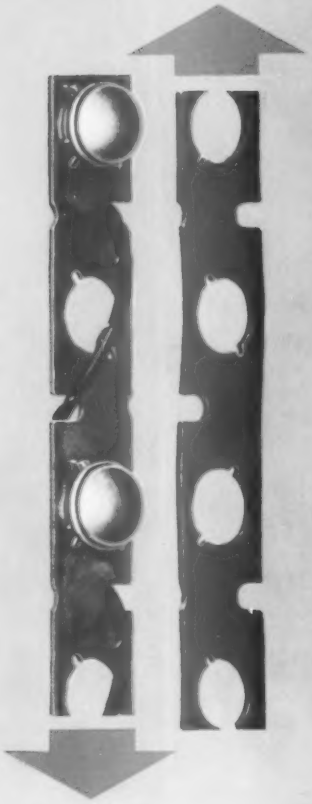
Described in OIL AND GAS JOURNAL - Issue of June 13, 1960

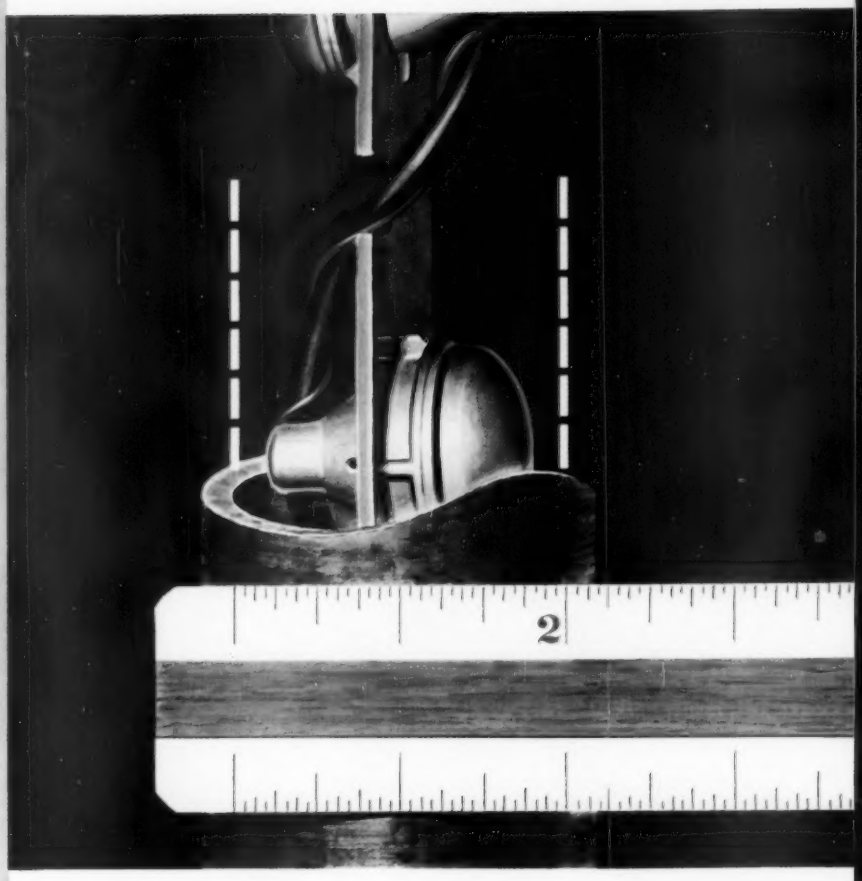
NAME ..... TITLE .....

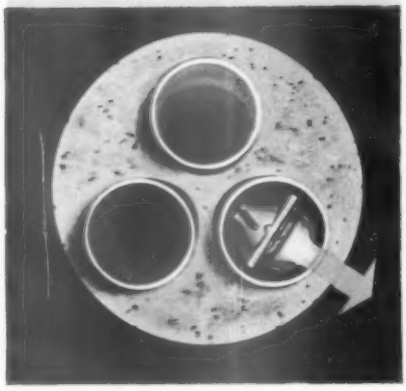
COMPANY .....

ADDRESS .....

CITY ..... STATE .....







the Schlumberger 1 11/16″ Ribbon Jet solves the problem of perforating ultra-slim casing

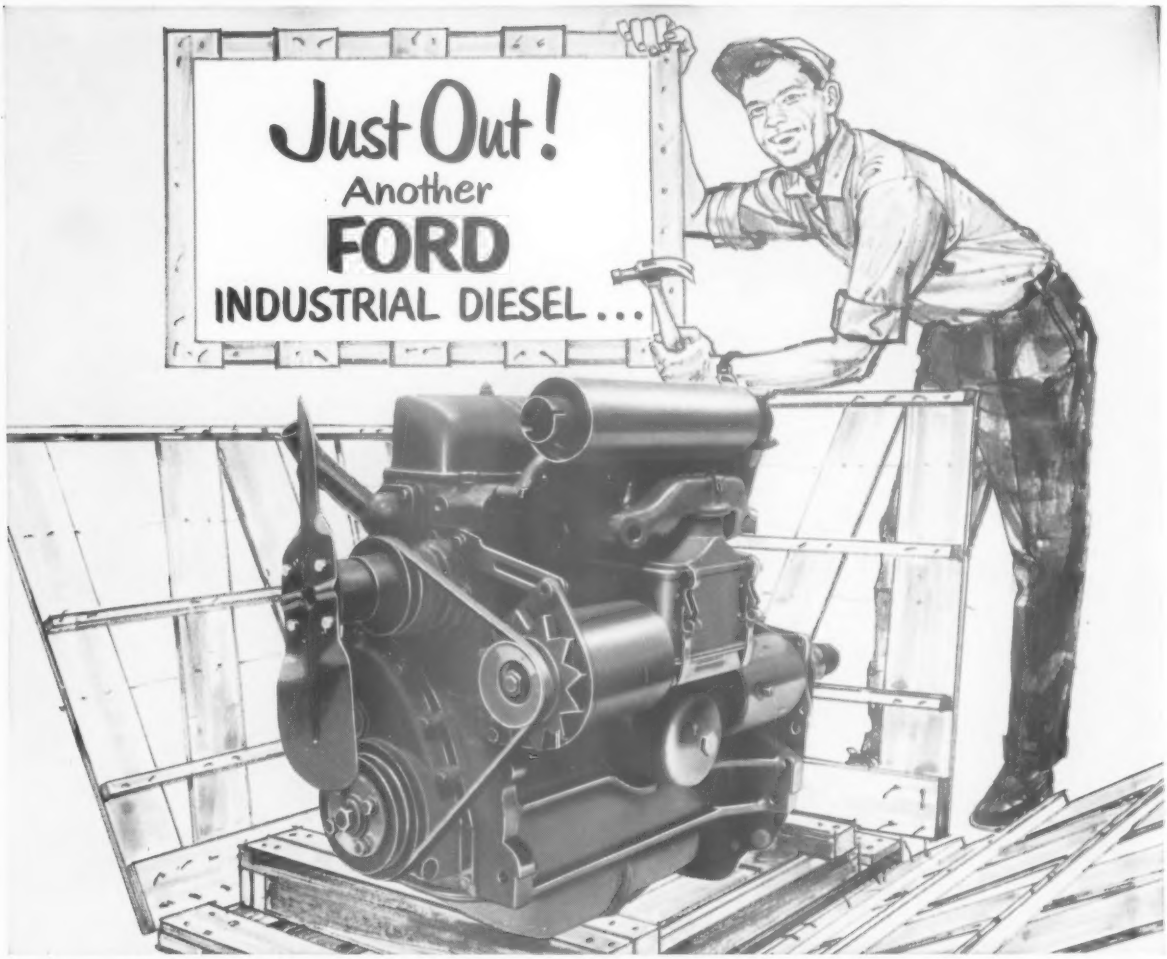
MINIMUM DEBRIS—*Eliminates bridging*
VARIABLE SHOT DENSITY—*With no spacer debris*
ORIENTED—*For multiple tubingless completions*
PENETRATION—*Proven by production through multiple strings of casing*

When an oil company in the Rocky Mountains determined that economics called for setting 2″ tubing as casing in a large, water-flood project, it faced the problem of perforating this small pipe. The debris from capsule perforators, harmless in larger casings, bridged the ultra-slim casing to interfere with production. The Schlumberger Ribbon Jet with its negligible debris solved the problem completely. Thirty-three wells have now been efficiently perforated in the project.

This is another example of Schlumberger engineering applied to a special problem. Whether your perforating operations are routine or unusual, consult Schlumberger and get the benefit of broad engineering experience.

THE EYES OF THE OIL INDUSTRY®

SCHLUMBERGER



FORD PRESENTS THE 172 CUBIC INCH DIESEL FOUR!

(and it's interchangeable with the 172-cu. in. gasoline engine)

To meet the growing demand for diesel power, Ford now offers a choice of three economical diesels—the highly efficient 172-, 220- and 330-cubic inch models.

Whichever you select, you'll be getting a completely modern diesel that delivers the high torque necessary to handle tough jobs with outstanding operating economy and easy, low-cost maintenance.

Ford Diesels also offer dependable 12-volt electrical systems for quick starting . . . replaceable cylinder sleeves that eliminate costly reboring . . . and rotating exhaust valves for better seating, longer valve life.

What's more, Ford's 172 Diesel and 172 Gasoline engines are *interchangeable* in your equipment. Many *parts*, too, are interchangeable between these engines. And low-cost Ford parts and service are always available at any nearby Ford Power or Tractor Dealer.

For greater productivity and more profit in the long run, it will pay you to check the 172 model or other Ford Diesels at your Ford Industrial Products Headquarters.

Ford
INDUSTRIAL ENGINES
AND POWER UNITS

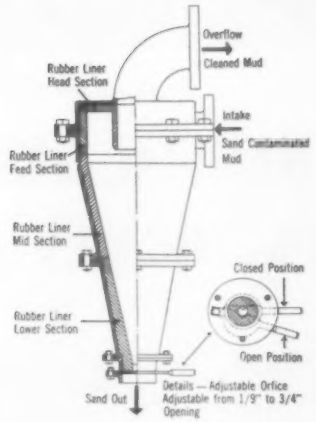
ENGINE SERIES		172 FOUR DIESEL	220 FOUR DIESEL	330 SIX DIESEL
Basic Model		DD	X	Y
Type		4-Cyl. O.H. Valve	4-Cyl. Diesel	6-Cyl. Diesel
Bore and Stroke—Inches		3.9 x 3.6	3.94 x 4.52	3.94 x 4.52
Displacement—Cubic Inches		172	220	330
Brake Horsepower	Dynamometer	59 @ 2400	60 @ 2250	96 @ 2250
	80% Dyn. BHP	47 @ 2400	48 @ 2250	77 @ 2250
Torque	Dynamometer	140#' @ 1200	151#' @ 1600	236#' @ 1600
	80% Dyn. BHP	112#' @ 1200	121#' @ 1600	189#' @ 1600
Compression Ratio		16.5 to 1	16 to 1	16 to 1

INDUSTRIAL ENGINE DEPARTMENT, FORD DIVISION, FORD MOTOR CO., P.O. BOX 598, DEARBORN, MICH.

West of Rockies write to:
→ FORD INDUSTRIAL ENGINE DEPT., P.O. BOX 6787, LOS ANGELES 22, CALIF.
→ FORD INDUSTRIAL ENGINE DEPT., P.O. BOX 1666, RICHMOND, CALIF.

SHOWCASE . . .

New Equipment



Lost-circulation

. . . material saved with a new desander. Additionally, it saves weight material and controls mud to the desired weight, the maker claims. Too, it keeps sand content of the mud as low as 0.5%. The unit is equipped with an engine or electric motors and centrifugal pump as required. Components with cone cluster are mounted on heavy H-beam skids. Available capacities range from 250 to 1,000 g.p.m. Source: **Thompson Tool Co., Iowa Park, Tex.**

●

Magnet

. . . removes metal cuttings from drilling mud systems and so offers a way to reduce wear to pumps and other equipment caused by recirculation of steel cuttings in the mud system. The Ditch magnet is installed in the system between the shale shaker and reserve pit. Adjustable wings at the en-

NEW FROM OTIS

TYPE BC WIRE LINE BRIDGE PLUG

- Short, compact—less to drill up.
- Small O. D. for easy running.
- Covers wider range of casing weights.
- Can be set with any pressure setting tool.

Here's a casing bridge plug with more plus features than any other plug on the market—yet it costs you no more! It's short and compact—less to drill up—designed to save you up to 50 per cent in rig time when the plug is removed. The Type BC Otis Wire Line Bridge Plug is designed to provide a positive plug, to prevent movement of fluid or gas from either direction in the casing, or to plug and abandon. The Type BC has a small O.D. for ease of running—yet it is designed to set in a wider range of casing weights than any other plug available today.

AVAILABLE THROUGH ANY ELECTRIC LINE SERVICE COMPANY. The Type BC Otis Wire Line Bridge Plug is available through any electric line service company and may be set with any pressure setting tool. Otis bridge plugs are stocked at more than 247 different field locations to make sure they are readily available to the service company of your choice. The next time you need a bridge plug — specify Otis.

© 1960 O.E.C.

OTIS ENGINEERING CORPORATION
General Offices: 6612 Denton Drive, Dallas
Branches Throughout the Oil Country

NOW—DRY NATURAL GAS MORE ECONOMICALLY

...WHEN YOU ADSORB WITH LINDE MOLECULAR SIEVES

This is only one of many applications which utilize the high capacity and selectivity of LINDE Molecular Sieves. In fact, Molecular Sieves not only outperform other adsorbents, but do other adsorption jobs never before accomplished. Whether in new installations or as replacement adsorbent in existing units, Molecular Sieves can help you minimize both investment and operating costs. More specifically, here's how they are used. . . .

A major petrochemical company has reduced the CO_2 content of its ethylene from 3000 PPM to less than 1PPM. This high purity is achieved in a single-stage process, automatic and non-corrosive, which has proved to be more economical than the alternative four-stage process. Other petrochemical uses include drying of cracked gases, ethylene, hydrogen, liquid propylene, solvents and many other gases and liquids. **Natural gas producers** use Molecular Sieves for drying and sweetening of natural gas, for sweetening of liquid propane and butane, and for drying of adsorber oil. **Petroleum refiners** use them to gain efficiency in drying reformer hydrogen, liquid butane LPG and transformer oil, and for removal of impurities such as CO_2 and mercaptans. **Refrigeration manufacturers** use Molecular Sieves as a desiccant in super-drying refrigerants to eliminate freeze-up and corrosion.

For these and many other adsorbent applications, you can rely on patented LINDE Molecular Sieves to perform more effectively. They are the top quality material of their kind available today, always uniform, with high capacity, high strength, and high bulk density. They are available in regular and special grades to meet your specifications.

LINDE technical know-how—gained from years of laboratory and field work with adsorption problems—can help make Molecular Sieves work profitably for you. For further information, write: Dept. 0-063 Linde Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. **In Canada:** Linde Company, Division of Union Carbide Canada Limited, Toronto 7, Canada.

SOME AREAS WHERE MOLECULAR SIEVES IMPROVE ADSORPTION

- Purification of ethylene
- Drying gases, liquids, solvents
- Drying, sweetening natural gas
- Sweetening liquid propane, butane
- Drying jet fuels
- Octane improvement
- As refrigerant desiccant
- Controlled atmosphere purification

LINDE COMPANY

UNION CARBIDE

"Linde" and "Union Carbide" are registered trade-marks of Union Carbide Corporation

New Equipment

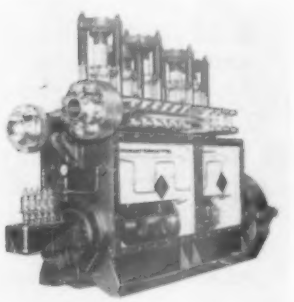
trance to the unit direct mud flow through the barrel, in which a 3-in. o.d. by 22-in. magnetic element is suspended. Source: **K & G Oil Tool & Service Co., Inc., Houston, Tex.**

●

Anchor-type weight indicator

. . . is available for small drilling rigs, workover units, and production hoists. The Type G indicator is scaled down from the maker's larger indicators to be light in weight for the stringent needs of portable rigs. A deadline anchor is side mounted to the derrick leg or other structure and provides a permanent mounting for the pressure signaling device. This unit sends a lineal signal to the indicating gage mounted in front of the operator. Source: **Martin-Decker Corp., Cherry Avenue & Wardlow, Long Beach 7, Calif.**

●



Latest pump

. . . for secondary recovery, a quintuplex type, has a 5-in. stroke with plungers ranging in diameter from 1½ to 3¾ in. The QPA-5000 Series pump is designed for continuous service and is capable of developing 230 b.hp. at 360 r.p.m. Capacity ranges up to 14,700 bbl. of fluid per day at 825 psi. Pressure rating extends up to 5,150 psi. which will, according to the maker, meet the most extreme requirements in most water-flood operations. Besides water-flood operations, the pump is also suited for handling other fluids.

A companion product, designed primarily to drive the pump, is a new horizontal, twin-cylinder, two-cycle gas engine with a continuous service rating of 230 b.hp. at 360 r.p.m. Source: **Ajax Iron Works, Corry, Pa.**

●

Gravitometer

. . . aids oil blending as well as blending of a variety of other liquids to a constant outgoing gravity. The Sinclair-Cenco gravitometer is designed to direct liquids of differing specific gravity into specific pipelines or storage facilities, to continuously measure the gravity of a liquid flowing through a pipeline for quality control, and to obtain a permanent specific gravity record. It records the gravity corrected to 60° F. regardless of the temperature of the flowing liquid. Response time is 30 to 35 seconds. Measuring tolerance is ±0.1° API over the measuring range. Source: **Central Scientific Co., 1700 Irving Park Road, Chicago 13.**

●

Casing pump

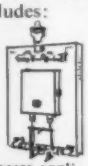
. . . for high-volume wells where increased plunger displacement is needed to obtain desired production features both the anchor and seal at the top. The fluid column is held above the seal to stop sand and foreign material from sticking the pump and packer. A mechanical bypass valve stays open while going in or coming out of the hole. Three dove-tailed slips support the fluid weight in the casing.

Most of the D+B casing pump is assembled from standard pump parts,

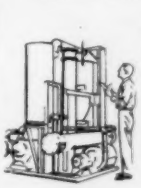
WILLIAM C. DIMAN,
Atmosphere Equipment Specialist, reports . . .

MODERN PROCESSES DEMAND MODERN ATMOSPHERES

Ever since 1927, when C. I. Hayes perfected the first controlled-atmosphere heat treating furnace, we have made a steady effort to further the technology of atmosphere generators and dryers. By recommending proper generators and dryers, we have helped our customers speed production, improve product uniformity and quality and save processing time and trouble. The big Hayes equipment line includes:



MOLECU-DRYER (using LINDE'S Molecular Sieves) — for drying, sweetening, purifying protective atmospheres and for gas and liquid separation and recovery. Exit gas dew points to less than minus 100°F. Many standard sizes available for process applications, instrument air drying, etc.



Linde MOLECULAR SIEVES

NITROGEN GENERATORS (using LINDE'S Molecular Sieves) — produces 99.99% pure inert gas at about 20¢ per 1000 cu. ft. Standard sizes from 1000 CFH to 10,000 CFH

"ENGINEERED ATMOSPHERES" — HAYES offers a broad range of equipment for producing oxidizing, reducing, carbon-potential, and nitrogen-hydrogen atmospheres . . also engineered equipment packages for stand-by (start-ups, emergencies, etc.). Standard sizes are available in all types Exothermic, Endothermic, and forming gas generators — also ammonia dissociators.

Hayes offers more than just equipment. Our Engineering organization and experimental lab. are ready to help make sure you get the right atmosphere equipment for your work.

ASK FOR BULLETINS . .	Bulletin No.
Molecu-Dryer	5703-A
Nitrogen Generator	5901-NI
Exothermic Generator	256-A
Endothermic Generator	5808-A
Ammonia Dissociator	5810-D
General Bulletin	5810-GC
Forming Gas Generator	256-A

C. I. HAYES, INC.
Established 1905
355 WELLINGTON AVE., CRANSTON 10, R. I.

BUILDERS OF FURNACES

It pays to see Hayes for metallurgical guidance, lab facilities, furnaces, atmos. generators, gas/liquid dryers.

from ***PLASTICAP ADVANCED RESEARCH***

NEW

plasticap A

BAKED-ON PHENOLIC COATING FOR CORROSION AND PARAFFIN CONTROL OF TUBULAR GOODS AND EQUIPMENT

Plasticap sustained research and testing advancements develop the newest and most effective coatings — and check them most completely — so Plasticap coatings have security and durability *built-in.* You are safe when you specify, safe when you install Plasticap.
NOW — new Plasticap A gives you —
NEW greater flexibility
NEW tougher film
NOW: thicker coatings possible (as needed) without reduction of flexibility

You protect yourself and your pipe when you specify Plasticap. More tubular goods are coated with Plasticap than with any other coating.

Plasticap
PLASTIC APPLICATORS INC.

Harvey, La. FI 1-1636
P. O. Box 7631 Houston, Texas UN 9-3611
Odessa, Texas EM 6-4491

Midland, Texas
Dallas, Texas
Corpus Christi, Texas
Hobbs, N. M.
Houma, La.
Tulsa, Oklahoma
Shreveport, La.
Lafayette, La.
New Orleans, La.

WRITE, WIRE OR PHONE FOR NEW CATALOG

PLASTICAP ADVANCED RESEARCH

The Plasticap name on your coatings means you have the protection of the most advanced formulations, most completely tested and ready for field use.

Plasticap spells Progress. Continuous research maintains Plasticap leadership by professional specialists whose training and field experience are your safeguard in purchasing and installing Plasticap products.

It's better to Plasticap than to Replace. In purchasing, you're always safe with Plasticap coatings. In installing, you're always secure with Plasticap — coated pipe . . . because Plasticap products are produced with advanced research and protected by realistic testing.

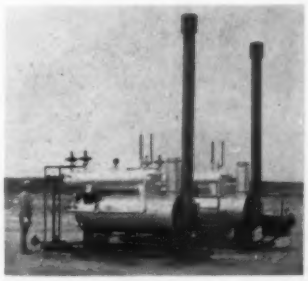
You protect yourself and your pipe when you specify Plasticap.

Write, wire, or phone for new catalog.

Plasticap
PLASTIC APPLICATORS INC.

minimizing down time during pump repair. The pump is available in sizes from 2¼ through 3¾ in. for casing sizes from 4½ to 8⅝ in. o.d. Source: **Continental - Emsco Co., Continental Building, Dallas.**

●



Gas-condensate

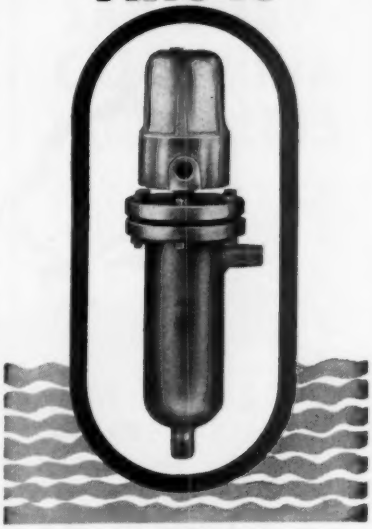
. . . production unit available now is a prepiped, skid-mounted type that combines any of the maker's two or three-phase horizontal separators together with any size indirect heater. The Thermosiphon Stat-Pak unit includes a flame arrestor which permits grouping a heater and a separator on the same skid together with automatic instrumentation. The separators are code constructed and stamped with code-required relief valves and safety heads. Source: **National Tank Co., Drawer 1710, Tulsa.**

●

Pneumatic

. . . indicating transmitter for pressure, flow, temperature, liquid level, differential pressure, and dew point now on the market features measuring elements specifically designed for each major process variable. The Model 45 transmitter features link and lever calibration and few moving parts. The maker reports it is easy to adjust and keep up. Its 6⅛-in. scale and fluorescent pointer are easy to see for local indication. Source: **Foxboro Co., Foxboro, Mass.**

This is



LEVEL MASTER®

The UNFAILING Liquid Level Control!

The ability to function with *continuous, sensitive control* with liquids is the standout feature of Level Master. The "brain" of Level Master is the unique Bell Magnetic Proximity switch incorporating a permanent Alnico V magnet that responds instantly to changes in liquid level!

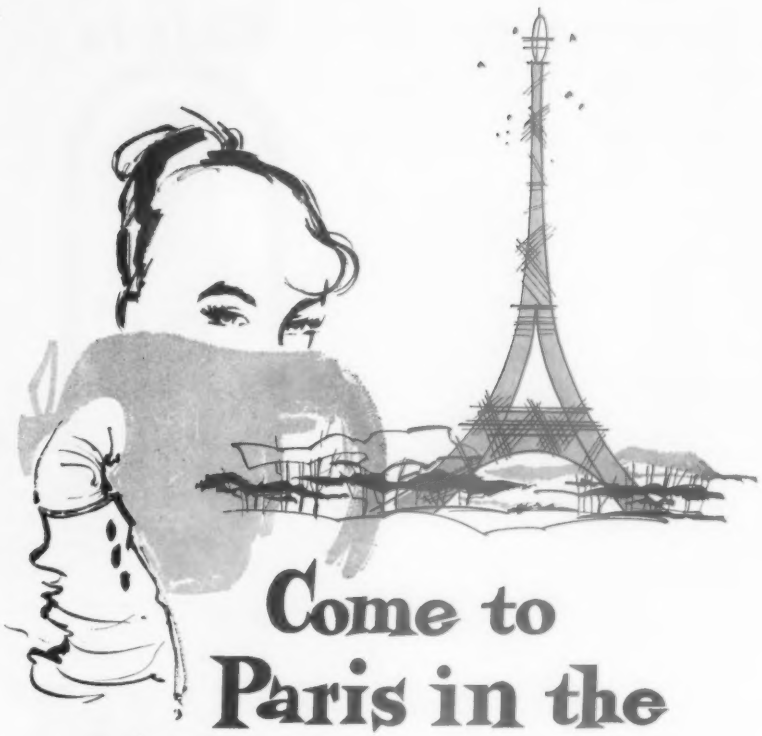
- *Models for all types of liquids.*
- *Horizontal, vertical, external mountings.*
- *Precision engineered for long life operation.*

For full information consult your Level Master representative or write directly to:

JO-BELL PRODUCTS, INC.
5456 W. 111th St. • Oak Lawn, Ill.
Phone GArden 5-0240

Jo-Bell Products, Inc. Dept. D
5456 W. 111th St., Oak Lawn, Ill.
Send full information on Level Master and name of nearest representative.

My name_____
Company_____
Address_____
City_____ Zone____ State____



Come to Paris in the Fall... *or anytime at all*

FOR PERFECT SALES and SERVICE ON OIL FIELD, REFINERY, AND INDUSTRIAL EQUIPMENT FROM THE FOLLOWING NATIONALLY KNOWN MANUFACTURERS:

ALTEN FOUNDRY & MACHINE WORKS
Lancaster, Ohio
Lubricated Plug Valves and Cocks.

DRESSER MANUFACTURING DIV.
Bradford, Pa.
Seamless Welding Fittings, Couplings and Sleeves.

THE FAIRBANKS COMPANY
Binghamton, N. Y.
Bronze and Iron Valves.

THE GORMAN RUPP COMPANY
Mansfield, Ohio
Centrifugal Pumps.

HARRISBURG STEEL COMPANY
Harrisburg, Pennsylvania
Forged Steel Flanges and Seamless Casing Couplings.

LOS ANGELES BOILER WORKS, INC.
Los Angeles, Calif.
Welding Caps—Dished & Flanged Heads.

MILLS IRON WORKS, INC.
Los Angeles, Calif.
Seamless Swage Nipples, Bull Plugs & Welding Reducers.

OIL STATES EQUIPMENT COMPANY
Houston, Texas
OSECO Silvertop Fusible Plugs with renewable inserts for all types OIL COUNTRY BOILERS.

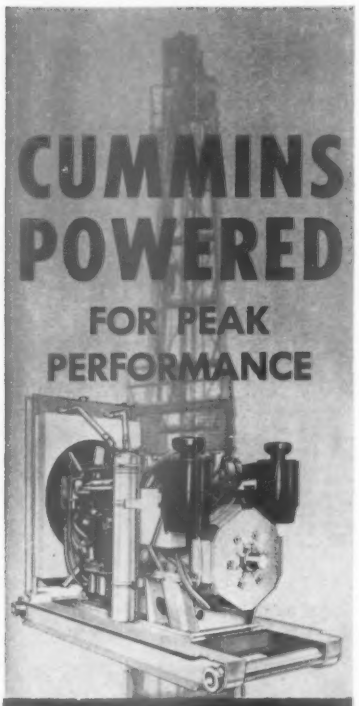
STEEL FORGINGS, INC.
Shreveport, La.
Weld Saddles.

VOLCANO BURNER COMPANY
Houston, Texas
Volcano Superior and Gulf States All Steel Gas Burners for OIL COUNTRY BOILERS.

WESTERN SAFETY BARREL STAND
Houston, Texas
Stand lifts, holds, tilts 55 gal. barrels. Prevents spillage—easily loaded.

WHEELING MACHINE PRODUCTS CO.
Wheeling, West Virginia
XL Steel Pipe Couplings for OIL COUNTRY TUBULAR PRODUCTS.

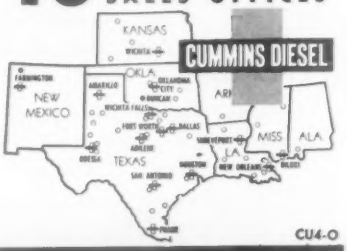
HENRY H. PARIS DISTRIBUTOR, Inc.
OIL WELL, REFINERY AND INDUSTRIAL SUPPLIES
1125 ROTHWELL ST. • P. O. BOX 932 • HOUSTON, TEXAS



CUMMINS VT-12 ELECTRIC DRILLING UNIT

More and more drilling contractors are specifying Cummins VT generator power for their electric drilling equipment. These contractors have found that these Cummins 12-cylinder TURBODIESEL engine powered generator sets give them important benefits of proven dependability, faster drilling, minimum move and rigup time, reduced initial investment and Cummins service. Get full details now from your nearby Cummins representative about the powerful, compact VT-12 TURBODIESEL for every oil field use.

16 FACTORY-TYPE SERVICE SHOPS SALES OFFICES



CU4-O

CUMMINS
Sales & Service, Inc.
P. O. Box 10338
FORT WORTH 14 TEXAS

Deeper sand penetration

. . . and extended fractures with water and acid-base fracturing fluids are possible with a new multipurpose fluid-loss agent, WAC-8, according to the maker. Fluid retention properties of the chemical reportedly approximate 20 to 25 ml. in 30 minutes. The material may be used with either batch or continuous mixing operations in strong or weak acid solutions, or fresh or brine water. Source: **Halliburton Oil Well Cementing Co., Duncan, Okla.**

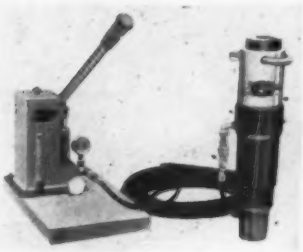
•

Perforating package

. . . announced is designed for perforation of wells in which temperatures exceed the limit imposed by ordinary explosives. The equipment is designed to fire with full power after exposure to 430° F. for 1 hour and has withstood repeated laboratory tests under these conditions, the maker reports.

Research and development on the package was performed in the Paris laboratory of the maker's associate company, Societe de Prospection Electrique. Source: **Schlumberger Well Surveying Corp., Box 2175, Houston.**

•



Long-lasting wire-line oil saver

. . . features a large, one-piece rubber packing element. The rubber and bushings are designed to force the rubber to feed inward as well as upward and downward and to effect a constant seal until the rubber is almost completely consumed.

The base for the Type H hydraulic wire-line oil saver is available with any of three field connections. The rubbers and bushings come in two line-size ranges: ⅜ to ⅝ in. and ¾ to 1 in. Source: **Guiberson Corp., One of the Dresser Industries, 1002 Forest Avenue, Dallas.**

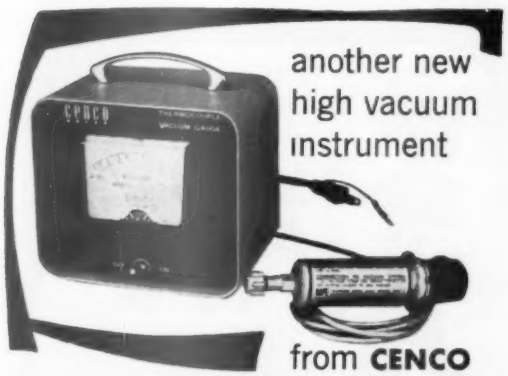
SAN DIEGO, CALIFORNIA 1,000 ACRES

Near the center of San Diego, in the path of tremendous growth. Overlooking beautiful lake and Pacific Ocean. One of the outstanding properties for investment or development that we ever had to offer. Priced at $2,500 per acre. This land is superior to land in the area selling for $5,000 per acre. Very best terms. Will consider good income property for half, but prefer sale. Can offer up to 2,000 acres if desired. THE BEST CHANCE YOU EVER HAD TO MAKE THREE MILLION DOLLARS. Please ask for our brochure giving details.

Shelby B. Persinger
or Richard B. Miller
with

Percy H. GOODWIN COMPANY
ESTABLISHED 1919

Exclusive Brokers
600 First Nat'l Bldg.
San Diego 1, Calif.



another new high vacuum instrument from CENCO

THERMOCOUPLE GAGE

Continuously measures total pressure of gases in the range 1-1000 microns Hg. Direct reading, self-regulating, sturdily built for industrial use. 115 volt, 60 cycle AC operation. Write for details.

CENCO No. 94178, in compact metal case, each **$110.00**

cenco®

REFINERY SUPPLY CO.
A Subsidiary of Central Scientific Co.
621 East 4th Street • Tulsa 20, Oklahoma
Branches and Warehouses—Mountainside, N. J. Boston • Birmingham • Santa Clara • Los Angeles • Tulsa Houston • Toronto • Montreal • Vancouver • Ottawa

NEW CORR-PREV TAPE COATING TEAM CUTS PIPE WRAPPING TIME

CHASEKOTE* Polyethylene Tape Coating
CHASEWRAP* Abrasion-Resistant Overwrap

At last! Here's a *one-source* tape coating package that offers all the items needed — including high-speed wrapping machinery — to save time, and save you money! This new CORR-PREV Team also gives you all the corrosion-fighting advantages of time-proved, job-proved *polyethylene* tape. No hot dope mess, drying time or clean-up problems. Half the spread. The result: More footage per day at *lowest applied cost* . . . plus longer lasting pipe protection, with far less cathodic current demand. Want samples, specs, prices? Write **CHASE & SONS, INC., 26 SPRUCE ST., NORTH QUINCY, MASS.**

CORR-PREV DIVISION

*Trade name of Chase & Sons, Inc., long-famous for protective and insulating tapes for electrical wire and cable.

FOR COPPER, BRASS and ALUMINUM . . . INSIST ON

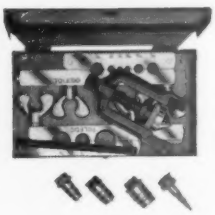
TOLEDO®

Quality Checked

TUBING TOOLS

TUBING CUTTERS
Range ⅛" thru 4 ⅛" O.D.

TUBE & FITTINGS
CLEANED, DEBURRED
All Sizes thru 4"



FLARING, SWAGING
Range ⅛" thru 1 ⅛" O.D.

LEVER-TYPE BENDERS
Range ¼" thru ⅝" O.D.

- ✓ **NEW, Advanced Features**
- ✓ **Long Service Life**
- ✓ **Smooth, Easy, Accurate**

For all copper, brass and aluminum tubing, Toledo offers fine precision made tubing tools at popular prices. Toledo Quality Checked to give you better on-job performance and long service life to help you increase job-profit dollars.

(SOLD THRU AUTHORIZED "TOLEDO" DISTRIBUTORS)

Write For New Catalog

TOLEDO® *Quality Checked*

PIPE THREADERS • WRENCHES • MACHINES • TUBING TOOLS

THE TOLEDO PIPE THREADING MACHINE CO...TOLEDO 3, OHIO

NEW N P WmSON "PIG-SIG II"

CAN BE INSTALLED OR REMOVED UNDER PRESSURE!

CUTAWAY VIEW OF PIPELINE

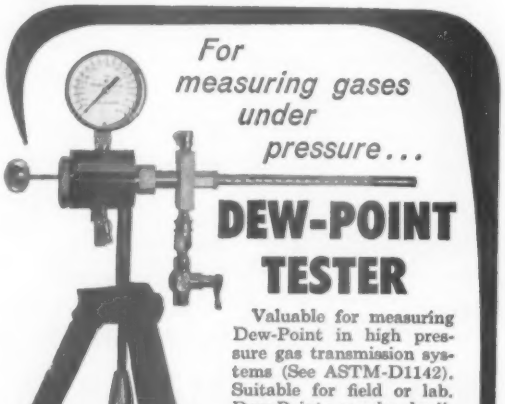
Gives visual or electrical indication of pig passage. Pig-Sig II with electrical indicator signals pump station operator or starts operation of automatic equipment. For other applications and complete details write for bulletin A-199.

WRITE DEPT. A2

T.D. Williamson, Inc.

P. O. BOX 40 TULSA 2, OKLAHOMA

REPRESENTATIVES AROUND THE WORLD



For measuring gases under pressure . . .

DEW-POINT TESTER

Valuable for measuring Dew-Point in high pressure gas transmission systems (See ASTM-D1142). Suitable for field or lab. Dew-Points can be duplicated within 0.2°F. Model "A2" (stainless steel) rated 3000 psi. Model "B" (nickel-plated brass) 1000 psi max. (Model B shown).

No. 35200 (MODEL A2) **$170.00**
No. 35210 (MODEL B) **$147.00**

cenco®

REFINERY SUPPLY CO.

A Subsidiary of Central Scientific Co.
621 East 4th Street • Tulsa 20, Oklahoma
2213 McKinney Ave. • Houston 3, Texas
Branches and Warehouses—Mountainside, N. J.
Boston • Birmingham • Santa Clara • Los Angeles • Chicago

SHOWCASE . . .

New Literature

Better welds

. . . booklet (6½ by 3¾ in.) contains 80 pages of arc-welding information. It gives data on five essentials for proper welding procedures, examples of good and bad welds, welding positions, operator qualifications, welding metals, steel available for welding, identification of metals, causes and cures of common welding troubles, check points for quality welding, welding symbols, electrode cost data, cost-saving hints, safety precautions, and other useful data. Source: **Hobart Brothers Co., Troy, Ohio.**

●

Remote-reading

. . . flowmeters for all types of liquids and gases at line pressures to 5,000 psi. are described in new Bulletin 59.5 currently available. Principles and engineering features of the electrical flowmeters are described, including typical electrical circuits, flow charts, piping and boiler arrangements, and piping requirements for orifices, flow nozzles, and venturi tubes. Source: **Republic Flow Meters Co., 2240 Diversey Parkway, Chicago 47.**

●

Industrial-capacitor publication

. . . tells how capacitors reduce power costs and increase system capacity. Twelve-page Booklet B-7642 briefly and simply answers many questions on capacitor applications. Subjects covered include a discussion of power factor, benefits of capacitors, how to select them, and where and how to apply them. Source: **Westinghouse Electric Corp., P.O. Box 2099, Pittsburgh 30.**

●

Wire rope

. . . and slings handbook, just released, shows abuses that shorten the life of wire rope and slings. It also points out correct ways to use them to add to service life. The 28-page handbook interestingly illustrates procedures with lively cartoon caricatures. Source: **Union Wire Rope Corp., Twenty-first and Manchester Avenue, Kansas City 26, Mo.**

WECO NO-GALL TOOL JOINT COMPOUND has more than 50% pure metallic zinc dispersed in a neutral oil with a tacky additive.

WECO LO-TORK TOOL JOINT COMPOUND has 50% metallic lead suspended in a neutral base with a tacky additive.

TREAT
Your Tool Joints to a
WECO COMPOUND

WECO Tool Joint Compounds, LO-TORK or NO-GALL, are the treatment your tool joints need for longer life, trouble-free service, easier make-up and break-out.

These Compounds meet every requirement for proper and efficient drill string thread lubrication. They provide low-friction make-up; will not squeeze out under high temperature or torque pressure; will not freeze the joint. They always remain soft in the can under all extremes of hot or cold weather for easy, time-saving application. They never require thinning.

WECO Compounds are stocked by Supply Stores everywhere for your convenience.

WECO® WELL EQUIPMENT MFG. CORP.
HOUSTON, TEXAS
Division of CHIKSAN COMPANY *a subsidiary of* FOOD MACHINERY AND CHEMICAL CORPORATION
C-1-60 fmc®

1000*

1000 — that's the number of Motor Control Center **structures* Nelson has supplied to a single industry in just the last 5 years.**

What better evidence of complete satisfaction could be desired? Nelson equipment is designed for complete dependability, easy installation, *and* is priced right.

This record of proven performance again confirms the fact that Nelson is

BIG ENOUGH TO PERFORM SMALL ENOUGH TO CARE

Be sure to let your Nelson representative figure your next job. You will find him listed in the Yellow Pages of major city telephone directories.

If *quick shipment* on Motor Control Centers is of importance to you, ask for a copy of Nelson's new *QUICK-TROL* Bulletin.

*** Ask your Nelson man for the name of the industry and the facts.*

NELSON *Electric* MANUFACTURING CO.
TULSA, OKLAHOMA
P. O. BOX 5385 RIVERSIDE 2-5531

Data-processing

. . . system, the Beckman 123, is fully described in eight-page Bulletin S-4017-A. Outlined is a method for developing a step-by-step program of "building block" process control. Source: **Beckman Scientific & Process Instruments Div., Fullerton, Calif.**

Buttress-thread

. . . casing bulletin features a comprehensive chart showing minimum performance properties of the casing. The publication details casing characteristics, outlines emphasis on quality control, and offers assistance of the manufacturer's field engineers. Source: **Youngstown Sheet & Tube Co., Stambaugh Building, Youngstown 1, Ohio.**

New meter Catalog

. . . 60-G contains information on oil-well meters, metering separators, well checkers, metering treaters, automatic custody-transfer meters, and calcium chloride gas dehydrators. Source: **Rolo Mfg. Co., P. O. Box 22126, Houston 27.**

Portable steel houses

. . . Bulletin 60-A contains details on knockdown types for export, trailer-mounted units, utility houses, and special fabrications up to 52 ft. long. Source: **Joe Stine, Inc., P.O. Box 14471, Houston 21.**

Wet-test meters

. . . in capacities to 1,200 cu. ft. per hour are detailed in newly announced Bulletin 501. It includes data on capacities, calibration, indexes, dimensions, and special models available. Also given are design features, construction materials, and accuracy for laboratory use. Source: **American Meter Co., 920 Payne Avenue, Erie, Pa.**

Find heating surface

. . . required for heating water by using a simple, foolproof, short-cut method described in a new single-page engineering sheet. The only factors required are: (1) gallons to be heated; (2) to what operating temperature; (3) in what minimum time; (4) "U" heat-transfer value; and (5) operating steam pressure. Source: **Dean Products, Inc., 1048 Dean Street, Brooklyn 38, N. Y.**

▶▶▶ Equipment Men Notes

J. H. Bews to manage

. . . the San Francisco branch office of Clark Bros. Co., one of the Dresser Industries. Bews joined Clark in 1951 and has served as technical service engineer, application engineer, and since 1957, as sales engineer at the Clark Los Angeles district office.

A. S. Johnson appointed

. . . field representative at Bakersfield, Calif., for Oil Well Supply Division, United States Steel Corp., according to D. S. Grubbs, California area manager. Johnson was employed by Oilwell in 1950 at Avenal, Calif., and was transferred to Bakersfield in 1951, and again to Taft in 1956.

V. L. Forsyth made V. P.

. . . of Udell, Inc., according to H. U. Garrett, president. Forsyth was formerly vice president and manager of the heavy-manufacturing division of Southwestern Industrial Electronics Co. He was associated with Lane Wells Co. for 20 years and served as manager of manufacturing and engineering, and technical assistant to the president.

V. L. Forsyth

Garrett also announced the appointment of J. M. Jackson as sales engineer at the company's Houston sales office. His oil-field experience includes designing and building small rigs, drilling contracting, design engineer for Dresser Industries, Inc., and as sales engineer with Black, Sivalls & Bryson, Inc.

Named district manager

. . . for Leschen Wire Rope Division, H. K. Porter Co., Inc., is R. K. Teske. He was formerly Michigan territory salesman. His new district includes all of Indiana, Michigan, Wisconsin, Minnesota, North Dakota, and parts of Illinois, Iowa, Ohio, and Kentucky.

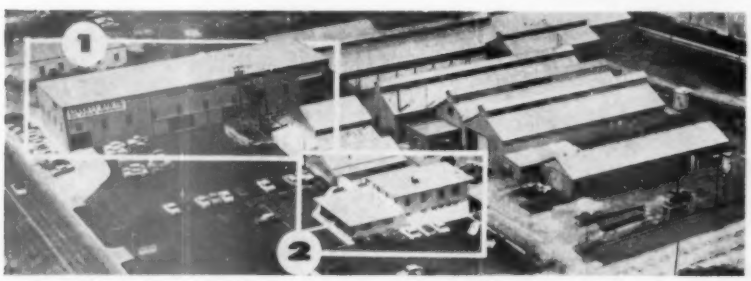
Working agreement reached

. . . by W. H. Larkin, president of Larkin Packer Co., Division of Koehring Co., and E. M. Blanchard, president of Alberta Oil Tool Co., Ltd., Edmonton, Alta., Canada, whereby Alberta Oil Tool will manufacture some items of the Larkin line in its Edmonton plant for distribution in Canada.

Blanchard said that his company would do the manufacturing and Larkin would do the selling. Plans are to gradually add other items in the Larkin line being manufactured in Canada.

Three new directors elected

. . . by Tex-Tube, Inc., to increase its board membership from six to nine. C. A. Carter, president, said the new board members are: I. W. Shaw, vice president, production; Walter H. Davidson, vice president, operations for Transcontinental Gas Pipe Line Corp.; and William G. Dwyer, associate attorney with the firm of Vinson, Elkins, Weems & Searls.



LIBERTY MFG. CO. completes the first phase of a $500,000 expansion program. It involved a significant increase in floor space in both plant and office in Fort Worth, as well as the addition of new manufacturing equipment. Number "1" in the photo shows the new plant building, which houses production equipment and storage area. Number "2" shows the new office building. Allowance was made, and space reserved, for the installation of additional machinery during the second phase of expansion. Included in the plant building are new threading machines, a custom-built painting machine which controls temperature and drying time, and another large overhead crane. The management team at Liberty is composed of W. A. E. Woods, president; John H. James, vice president; and Jack D. Gale, vice president in charge of sales.

S. A. Shuman transferred

. . . to Pittsburgh as assistant to the president of National Supply Co. He has been serving as general manager of Fluid Packed Pump Co., Division of National Supply. Shuman began his oil-field career in 1929 as a roustabout for Sinclair Oil & Gas Co. and joined Fluid Packed Pump as a sales and service representative in 1936. Successively he was made district sales manager in Louisiana, division sales manager in Oklahoma, Mid-Continent manager headquartering in Tulsa, general sales manager. He served as executive vice president from 1953 until the purchase of Fluid Packed by National Supply in 1959.

Fibercast Co. to operate

. . . under Continental-Emsco Co. Both firms are divisions of Youngstown Sheet & Tube Co. and both will continue to be separate divisions. F. M. Mayer, president of C-E, announced that C-E Vice President Craig Smyser will serve as general manager of Fibercast, a manufacturer of glass-fiber-reinforced plastic pipe at Sand Springs, Okla.

Plans are to expand the plant at Sand Springs to produce 6 and 8-in. pipe and fittings, in addition to the 2, 2½, 3, and 4-in. sizes now produced. Expansion is scheduled for completion in about 6 months.

K. R. Knoblauch boosted

K. R. Knoblauch

. . . by Minneapolis - Honeywell Regulator Co. to be market sales manager for its Industrial Products Group based in Philadelphia.

Knoblauch, with 36 years of service to M-H, will have supervisory responsibility over managers of nearly a dozen markets in which sales of industrial products are aligned.

R. L. Mallory, IPG sales manager, said that among other previous assignments, Knoblauch has been industrial manager for the Mid-Atlantic region, assistant general sales manager of Brown Instruments Division, and sales manager of the valve division. His

most recent assignment was as chemical-industry market manager.

Service seminar held in Dallas

. . . for owners and service managers from 15 Detroit Diesel distributorships and dealerships in the southwest. Under the direction of Chester B. Clum, Detroit Diesel general service manager, the seminar was designed to facilitate the exchange of information and ideas between distributors, dealers, and Detroit Diesel's service staff. New products, new product developments, distributor-dealer-plant relations, and service procedures and methods were discussed.

K. S. ADAMS is a new pipe-laying workshop craft just put into service by Sam Carline, Inc., Berwick, La., a pipeline-construction contractor. Although called a barge it's really a 300-ft. ship propelled only by its anchors and hoist equipment that haul the anchors. When movement forward is needed, the 8,000-lb. aft anchors are hoisted and the pull on the forward anchors moves the craft forward about 40 ft. Aft anchors are again lowered and forward anchors are repositioned. The process is repeated as pipe laying progresses. Orval Thorpe, in charge of the K. S. Adams, has designed the barge so that welding, fabricating, and inspection stations are built on a slight angle from both ends. Thus, as new pipe is positioned, it moves upward to a point midway of the ship, then it begins a gentle descent, reaching the water without danger in high seas.

These Bonds having been sold, this advertisement appears as a matter of record only.

$13,126,000

Trans-Canada Pipe Lines Limited

$8,260,000

First Mortgage Pipe Line Bonds, United States Series, 6¼%

Due October 1, 1978

$4,866,000

First Mortgage Pipe Line Bonds, Canadian Series, 6¾%

Due October 1, 1978

The issue and sale of the above securities were subject to the terms and conditions of Agreements negotiated by the undersigned.

Lehman Brothers

Stone & Webster Securities Corporation

White, Weld & Co.

Nesbitt, Thomson and Company, Ltd.

Wood, Gundy & Company Ltd.

McLeod, Young, Weir & Company Ltd.

Osler, Hammond & Nanton Ltd.

June 6, 1960.

Sales engineers appointed

. . . to West Coast sales-engineering posts by William Powell Co., Cincinnati valve manufacturer. Named by Powell Board Chairman H. James Coombe, are: William P. Simmons, regional sales engineer, San Francisco; and Robert A. Miles, district sales representative, Los Angeles.

R. D. O'Brien elected

. . . vice president of U. S. Industries, Inc., according to John I. Snyder, Jr., chairman of the board and president. O'Brien is charged with direction of three USI operations serving the oil, gas, and chemical industries and with planning expanded activity in world-wide petroleum equipment markets.

R. D. O'Brien

He is responsible for Garrett Oil Tools, of Longview, Tex., Axelson Manufacturing Co., of Los Angeles, and Oil Field Sales & Service, S. A., Maracaibo, Venezuela.

W. F. Krueger appointed

. . . representative for The Pipe Line Development Co. J. B. Smith, president, said that Krueger will serve in Texas and Louisiana. Pipe Line Development makes weld ends, Smith split coupling, Plidcoflange, Smith clamps, and other products for pipeline repairs.

Geophysical Service Inc., forms

. . . a new department for marine operations and makes several key appointments, announces R. C. Dunlap, Jr., president of the Dallas-based geophysical exploration firm. The marine operations, which will headquarter in London, will be primarily concerned with GSI's single-ship marine seismic exploration, including the 400-ton motor vessels Sonic and Texin.

Heading the operations is Paul V. Hodge.

Succeeding Hodge as equipment manager is Jack V. McManus, who had been GSI's chief field-service engineer since 1955. In turn, McManus will be succeeded by A. L. Sackery.

Transferring to GSI from the firm's parent company, Texas Instruments, Inc., is Richard D. Warrington who will take over as manager of accounting. James O. Cook becomes supervisor of general ledger accounting. R. H. Graham has been named purchasing agent for GSI in Dallas. He has been in the purchasing department since 1942 and was formerly materials control supervisor. L. C. Craig will succeed Graham. Carl O. Jackson will serve in Dallas as mechanical equipment supervisor.

UOP expansion boosts four

Schoenenberger

. . . to new positions in the marketing and manufacturing of Universal Oil Products Co.'s chemical - products activities. They are R. J. Schoenenberger, J. A. Neuman, D. D. Hansen, and W. K. Hunter.

Schoenenberger was appointed general manager of product sales and chemical-product development. He is succeeded as head of chemical-products development by Neuman, formerly manager of the manufacturing division in McCook, Ill. Hansen, formerly assistant manager of the Shreveport, La., manufacturing plant is now manager of the McCook plant. Hunter, formerly coordinator of supply and distribution, has been made head of catalyst sales.

F. H. Maloney Co. elects

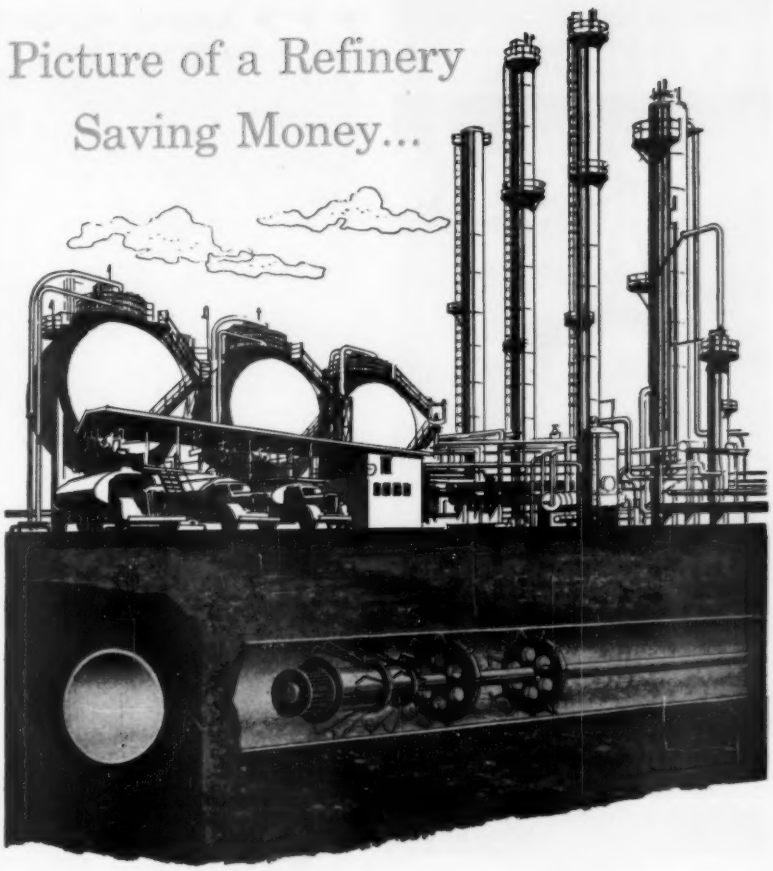
. . . two new directors to the board of the Houston manufacturer of rubber, plastic, and metal industrial products. The board also made promotions in the management group.

New directors are B. Hunter Loftin, partner in the law firm of Butler, Binion, Rice & Cook, and Ray F. Weston, Jr., who was also named secretary-treasurer of the firm. William B. Campbell, technical services director, was elevated to vice president, technical services.

Marshall W. Peters is elected

. . . vice president of sales development of Atlas Bradford Co. Previously general sales manager of Atlas Pipe, Inc., a division of Atlas Bradford, Peters will now have his headquarters in Houston.

Picture of a Refinery Saving Money...



Spunline Relines Pipe Lines in-place without removing the pipe

Another refinery, it could be in Texas, California or Montana, will soon be enjoying the savings of another rehabilitated pipe line. The flow will increase, the pumping cost will drop and the pipe line will be good as new for at least another quarter of a century.

And traffic will move without interruption or inconvenience to the public.

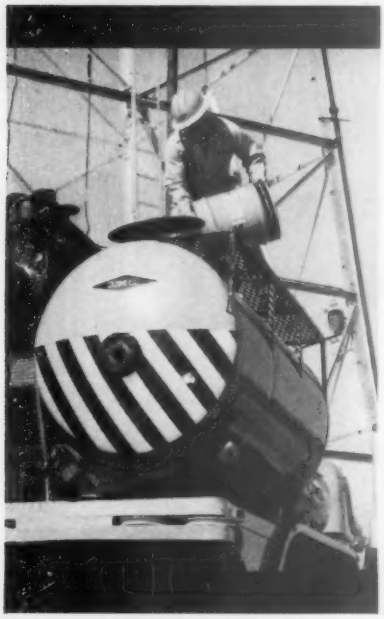
Spunline® is applicable to pipe lines down to 4" and may be used in cast iron, steel, concrete and wrought iron pipe lines.

Write, wire or phone PIPE LININGS Inc.

Subsidiary of American Pipe and Construction Co.

2414 East 223rd Street, Wilmington, California
P.O. Box 457 • Phones: SPruce 5-3273 — TErminal 5-8201
Rail Address, Pacific Electric, Watson, California

WATER BLOCK?



FREFLO

Freflo®—the Dowell product designed to remove water block—acts three ways to help you increase well production. First, Freflo reduces surface tension. Second, it attacks interfacial tension, makes the water and oil more compatible. And third, Freflo breaks emulsions and prevents them from re-forming. Freflo is economical; the 10-gallon steel drum contains enough Freflo for 1000 gallons of treating solution. Available at all Dowell stations.

Products for the oil industry

DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

DIAL DOWELL

THREE-LEGGED mobil drilling platform designed by R. G. LeTourneau, Inc., Longview, Tex., will work in Venezuela lake.

New rig designed to overcome soft mud of Lake Maracaibo

LAKE MARACAIBO will soon get its first tender-assisted, mobile, drilling platform. The unit will be observed closely by the Venezuelan oil industry which is becoming continually more cost-minded due to increased competition from the Middle East.

Because of the soft mud bottom on the Venezuelan lake, operators usually have stayed with permanent-type platforms. But Loffland Bros. Co., Tulsa drilling contractor, will go mobile with an R. G. LeTourneau three-legged platform, soon to be built at the LeTourneau Vicksburg, Miss., plant. Upon completion it will be towed to Venezuela where it will be used in drilling for Mene Grande Oil Co.

The $1,750,000 platform will have 21-ft.-diameter tank legs and the tanks will be 48 ft. tall—the tallest ever used on a LeTourneau platform. The reason for the large-diameter legs is that a similar LeTourneau platform used in constructing a bridge across the lake proved the stability of wide-diameter legs in the Maracaibo mud.

The unit can be used in water 105 ft. deep and will operate with one of Loffland's tenders already at the lake. The multipurpose platform can be used for stratigraphic survey, exploration, production, drilling, and workover.

In workover service it can be used on existing wells with wide variations in production platform designs and sizes. It can be floated into position with a larger than normal drilling slot.

Electrically powered legs are lowered to the lake bottom and the platform is elevated out of the water. The derrick and its equipment can be skidded in any direction on the plat-

Jimmie Gray®
500 TON
. . . now with
POLARIZED
ADDITIVE!

Greater "Clinging" Power for Increased Thread Protection!

Used on more wells throughout world-wide drilling industry!

SOLD ONLY THROUGH SUPPLY STORES

MONEY BACK GUARANTEE

USE JIMMY GRAY DOPE BRUSHES

PETROLEUM DISTRIBUTING CO.
BOX 203—HOUSTON, TEXAS—CApitol 4-9648

form by LeTourneau electric-gear motors so that it can be positioned over the wellhead. The half-million pound load's precise spotting thus becomes a pushbutton operation.

Tender-assisted, mobile drilling platforms have been used throughout the world but never before at Lake Maracaibo because of the soft-mud bottom. The unit under construction will be the thirteenth three legged type built by LeTourneau.

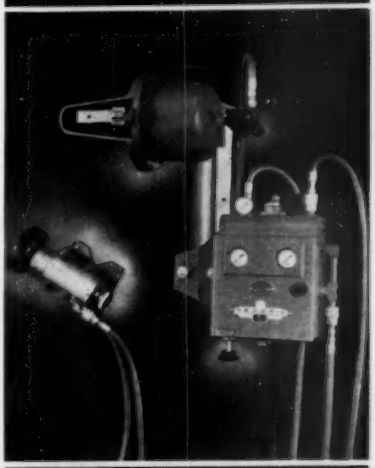
Rig idle in busy state

AN ALASKAN rig—a National 110—operated by Rowan Drilling Co., Fort Worth, which has been working for General Petroleum (now Mobil Oil Co.) near Becharof Lake on the Alaskan Peninsula, is now in Seward, Alaska. Humble Oil & Refining Co. owns the equipment and used it to drill a 14,374-ft. dry hole at Bear Creek on the east side of the peninsula. Humble engineer Charles Hill supervised the stacking of this rig until plans for its next operation are made.

General Petroleum drilled two dry holes, the Great Basins 1 and 2, to total depths of 11,080 and 8,865 ft., respectively. These were completed in July and October of 1959. Moving the rig from Bear Lake to Becharof Lake took over 4 months. It was brought back to Jute Bay by Mobil on the road it built last year.

SIGN OF SAFETY adorns the doghouse wall of Parker Drilling Co. of Tulsa Rig 60. The equipment drilled a deep test, Gulf 1 Bowers, in Hemphill County, Texas, in the Panhandle. Constant reminder to drilling personnel is the fact that safety is a personal factor and is in their hands. This unit has an unusually good safety record and the contractor feels that this type of reminder is invaluable.

The NEW
GEODRIL®
AUTOMATIC
DRILLER



gives you

1. LONGER BIT LIFE
2. FEWER TRIPS
3. STRAIGHTER HOLE

The GEODRIL Automatic Drilling Control was developed, tested and proved in the field by The Geograph Company, manufacturers of the internationally accepted Geograph Mechanical Well Logging Recorder.

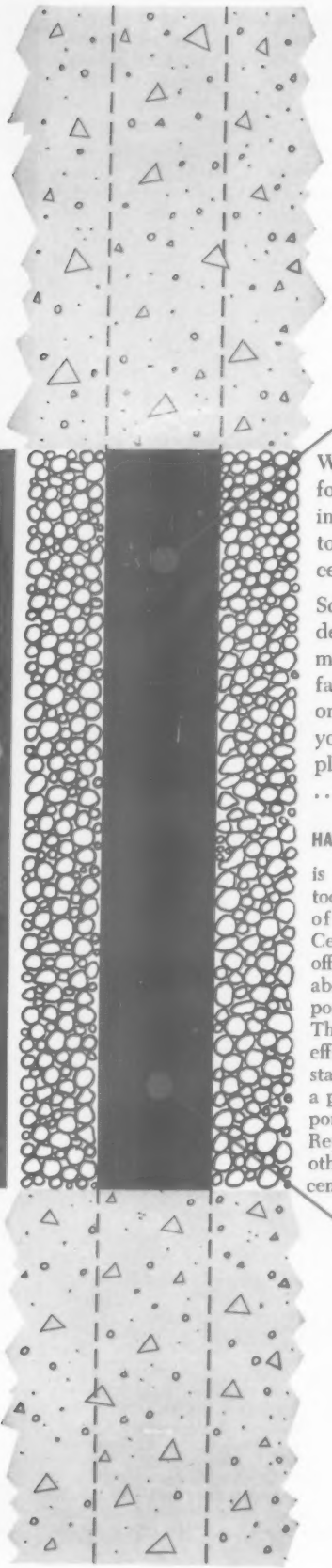
The new, automatic GEODRIL control has many outstanding features and offers the drilling contractor dependability, economy and safety.

Service for the GEODRIL Control is provided by the experienced personnel of Geograph Oil Field Services. Their reputation for service is backed by over a fifth-of-a-century of experience in the oil fields.

When you drill your next well, specify the NEW GEODRIL Automatic Driller for maximum drilling efficiency. For additional information, contact your nearby Geograph Oil Field Services office.

GEODRIL®
AUTOMATIC
DRILLER

GEOLOGRAPH®
OIL FIELD SERVICES
P. O. Box 1276 • Oklahoma City 1, Okla.



GUARD POROUS PAYZONES

When core samples indicate a weak, porous formation that should be protected from cement infiltration . . . that's the time to call on Halliburton for the tool that may help you place the cement *exactly* where you want it.

Some of the many Halliburton Special Tools designed to help provide proper cement placement are shown here. Take a minute to become familiar with the special duties assigned to each one . . . then, before your next cementing job, let your nearby Halliburton Representative help you plan the job with these CEMENTING TOOLS . . . designed to fill your orders to the letter.

HALLIBURTON "DV" PACKER CEMENTING COLLAR . . .

is a new combination cementing tool with all the proven features of the "DV" Multiple Stage Cementer . . . *plus* a rubber pack-off element to seal the annulus above the first stage and help support the second stage of cement. This useful tool is particularly effective in placing cement in two stages to straddle and help protect a pay zone with a relatively weak porous structure. Your Halliburton Representative can show you many other excellent applications of this cementing tool.

FOR CEMENTING DEPENDABILITY...

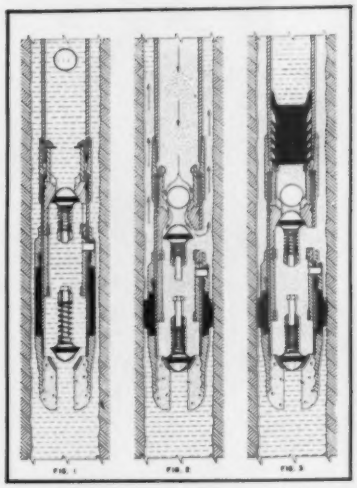
FORMATION PACKER SHOE

Here is the ideal tool for use where formation conditions require casing to be set above the producing formation. As shown in the diagram, the Formation Packer Shoe is run on the bottom of the casing string, and operates as follows:

GOING IN HOLE: The Super Seal Valve (upper) remains closed which allows the Shoe to help float the string into the hole. Full circulation is provided through the end of the Shoe until the packer is expanded.

SETTING: Upon reaching the desired depth, the weighted Setting Ball is dropped into the casing and allowed to settle into its seating ring. Applied pump pressure at the point where the ball is seated causes the two internal valve units, inner case and top packer shoe to move down, seating the lower valve and setting the packer. After the packer is set, continued pumping ruptures the seating ring, allowing the ball to drop down to the ribbed supports above the upper valve.

CEMENTING: Movement of the inner case and packer downward opens slotted cementing ports in the side of the tool. Passage of cement through these ports fills the annular space outside the casing from the top of the packer rubber up to the selected point in the hole. A top cementing plug is inserted to complete the job by helping displace the cement inside the casing down to the top of the tool.



Going In Hole | Job In Progress | Job Completed

FORMATION PACKER SHOE

FORMATION PACKER COLLAR

Nearly identical in design and operation to the Formation Packer Shoe, the Formation Packer Collar is usually installed several joints above the bottom of the casing string to help protect lower formations from cement infiltration. It is also popular for use in setting liners, perforated pipe and screen in salt water disposal wells, water injection wells and in full hole cementing.

ADD THESE ACCESSORIES

...for even better cementing results! CASING SWIVEL installed above Formation Packer Shoe or Collar allows casing rotation before and during cementing operation. This allows the use of ROTO WALL CLEANER to clean filter cake from the walls of the bore hole to help provide a better bonding surface for the cement. With the casing string centered by HALLIBURTON CASING CENTRALIZERS, helps to make it possible for the cement to fill the annular space outside the casing more evenly–more effectively ... and with less chance of channeling.

Casing Swivel

S-3 Casing Centralizer

HOWCO WELD

... for securing casing joints easier, faster – and even more strongly than tack welding.

Roto Wall Cleaner

HALLIBURTON CEMENTING SERVICES

HALLIBURTON OIL WELL CEMENTING COMPANY • DUNCAN, OKLAHOMA

275 SERVICE CENTERS . . . JUST MINUTES AWAY FROM YOUR WELL

Free sets of full-color reproductions of core samples, suitable for office decoration, are available. Request must be made on your company letterhead, and include name of this magazine and date of issue. Address — Core Lab, Box 10241, Dallas 7, Texas.

Underneath Venezuela

"U" Sand, Aguasay Field, Eastern Venezuela: producing depth, 14,027 feet; productive thickness, 180 feet; permeability, less than 0.1 to 250 millidarcys; porosity, 6 to 20%; residual oil, 34.5%; total water, 17.4%.

Today it would be unusual to find an active oil and gas area in a Free World country where basic reservoir information does not carry the Core Lab trademark.

Companies operating both domestically and overseas have long recognized the value of Core Lab's region-to-region standardization of core analysis equipment/procedures/techniques and the presentation of data.

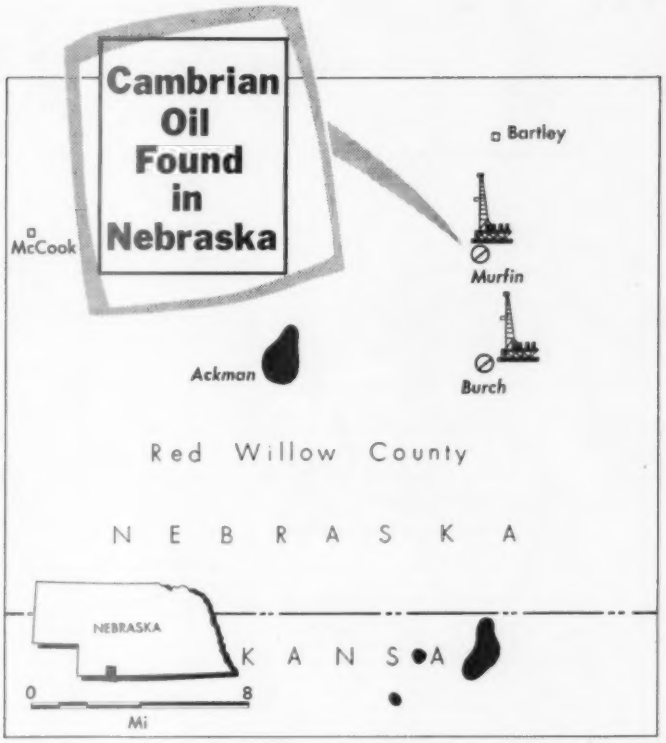
This plateau of technical stability, firmed up by continuous re-investment in practical research, simply means: *the recovery of more oil, more economically.*

CORE LABORATORIES, INC.

BOX 10185 DALLAS 7 TEXAS USA • CABLE ADDRESS CORELAB

CORE LAB

DALLAS ABILENE AMARILLO BAKERSFIELD BARTLESVILLE CASPER CORPUS CHRISTI DENVER EL DORADO FARMINGTON FORT WORTH HATTIESBURG HOBBS HOUSTON JACKSON KIMBALL LAFAYETTE LIBERAL LONG BEACH LOS ANGELES LUBBOCK McALLEN MIDLAND MONAHANS NEW ORLEANS OKLAHOMA CITY PAMPA PECOS ROCK SPRINGS ROSWELL SAN ANTONIO SHREVEPORT STERLING TULSA TYLER VICTORIA WICHITA WICHITA FALLS WILLISTON WORLAND CALGARY EDMONTON REGINA BOGOTA BUENOS AIRES FYZABAD MARACAIBO PORT-OF-SPAIN TRIPOLI ALGIERS PARIS



NEBRASKA has come up with its first Cambrian prospect. Previous production has come from Pennsylvanian and Cretaceous rocks in the western half of the state, and from Devonian and Ordovician rocks in the eastern half. Murfin Drilling Co. 1 Barth (arrow) is in final testing stages.

Nebraska dangles new bait for wildcatters

BY FRANK J. GARDNER

SOMEHOW, a discovery of oil in Cambrian rocks is always an intriguing news item. For one thing, such strikes are relatively rare. For another, the few that have been made are widely separated (from the Appalachians to Texas to the Rocky Mountains). And for yet another, Cambrian oil occurrence is still a puzzle to most oil finders; they feel that it should be a much more prolific source than it has proved to be, but that it's a neglected target in most drilling theaters.

A newcomer to Nebraska . . . Now, for the first time, Nebraska comes up with a Cambrian prospect. Murfin Drilling Co. 1 Barth, Section 25-3n-27w, in Red Willow County, has run casing after recovering 305 ft. of free oil and 120 ft. mud-cut oil on a test of Reagan sand at 3,395-3,425 ft. Murfin carried the well to total depth of 3,490 ft. At last report, the well was waiting on cement.

At about the same time, Red Willow County came up with a second important wildcat success at Burch Drilling Co. 1 Nokes, 4 miles south of the Murfin strike (see map). This one, in Section 13-2n-27w, is an apparent Lansing-Kansas City field opener; earlier, a report of Cambrian oil shows had this wildcat billed as a twin Cambrian discovery to the Murfin find, but later developments discount this.

Shifts interest eastward . . . These two discoveries, along with the rapid development of Ackman-Pennsylvanian field west of them, are perhaps the most important news makers in the Kaneb country since Skelly Oil Co.'s Cahoj and Reiher strikes in mid-1959 (OGJ, June 22, 1959, p. 147). They move the sphere of drilling interest far to the east of earlier southwest Nebraska wildcatting, right up the flanks of the Cambridge arch.

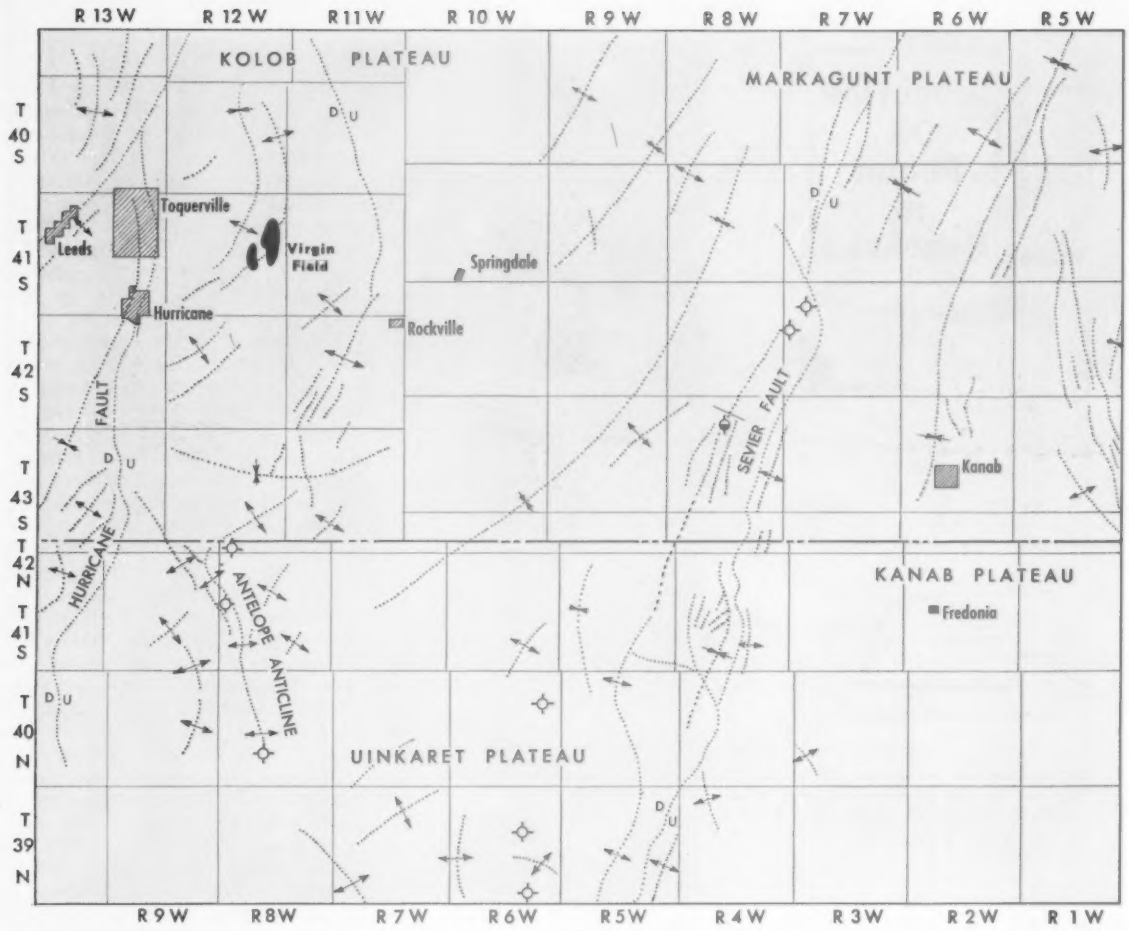
More important, the Cambrian discovery underscores the hidden potential of pre-Pennsylvanian reservoirs throughout the arch area. So far, all western Nebraska and northwestern Kansas fields have been Pennsylvanian or Cretaceous producers. But all along, geologists have felt that the Permian, Mississippian, and Cambrian rocks deserved a good hard look (Devonian, Silurian, and Ordovician sediments are absent here). The trap-forming prospects are double-edged. Mississippian carbonates and Cambrian sands feather out against the west flank of the Cambridge arch, and unconformities mark the upper boundaries of each system.

Spotting such traps won't be easy, of course, and subsurface and facies studies are the only approach. But as more and more drilling takes place, a trend of stratigraphic pools could easily emerge across Red Willow, Frontier, Lincoln, and Hayes counties. Wildcat drilling density so far is nil . . . current maps show only six wells in all of the west half of Frontier County, or one well per 84 sq. miles.

And spotlights other objectives . . . The Permian section, bypassed by most wildcatters in the race to Pennsylvanian targets, should have possibilities throughout western Nebraska. Natural-gas shows have been reported from wells as far west as Dundy County, and in several wells along the west flank of the Cambridge arch. The Permian section carries over the arch into eastern Nebraska.

In addition, the Dakota-Cretaceous sands that produce oil in the Denver basin are present here. Shows of oil and gas have come from these rocks, but so far no commercial fields have been found.

The multiplicity of reservoir rocks, the shallow depths (5,000 ft. or less), and the myriad stratigraphic and structural-trap possibilities, plus results already achieved, should attract many an independent wildcatter to southwestern Nebraska in the next few years. Cambrian rocks are only one among many magnets.



GENERAL CHARACTERISTICS of the Kanab region are indicated on this map. The anticlines, faults, and principal synclines are marked. It is not likely that the Virgin field is the only oil in this vast area. Potential zones are shallower to the south due to regional northward tilt. Fig. 1.

Kanab: The oil signs are there

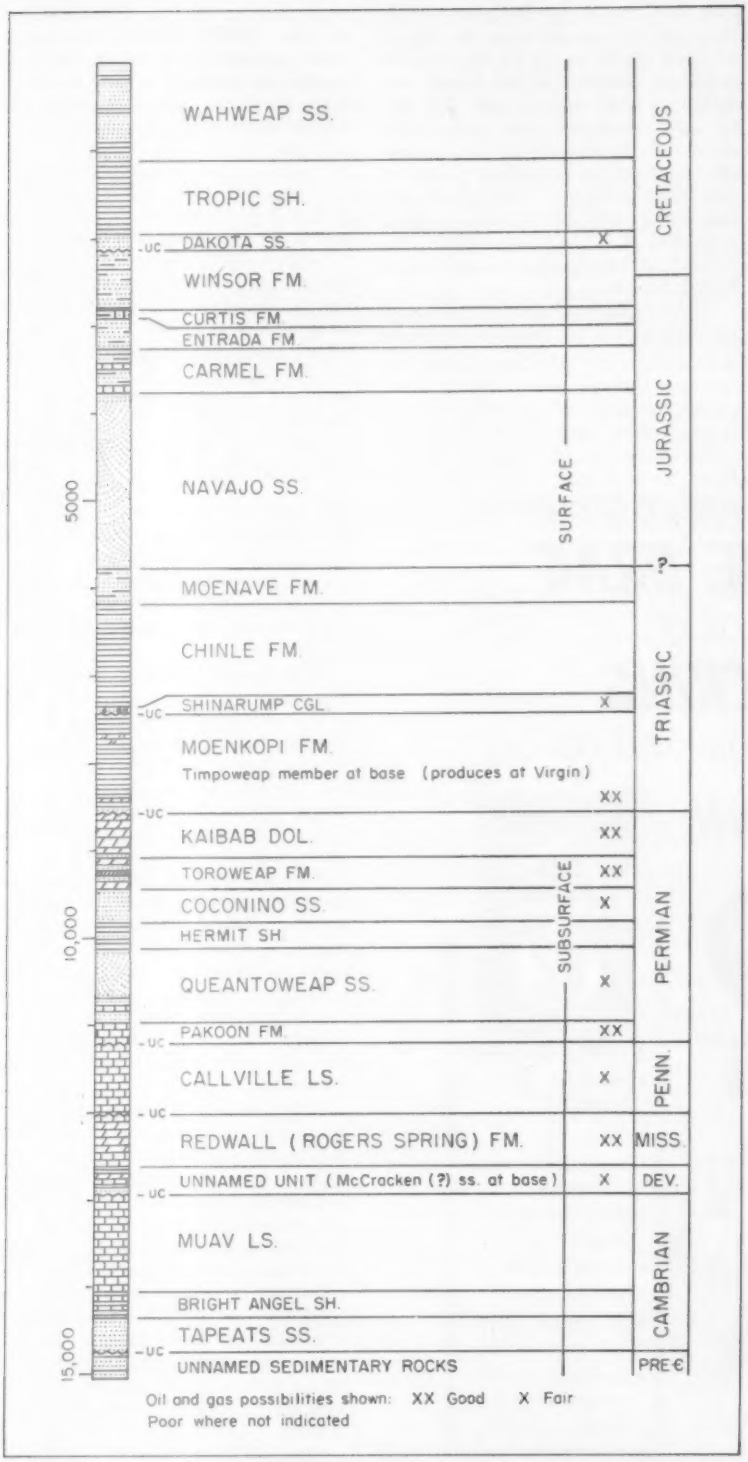
This Arizona-Utah region has the geological attributes to make it a commercial oil and gas province. Most of the region is accessible and drilling depths, for the most part, are within reason.

BY EDGAR B. HEYLMUN
Petroleum Geologist
Salt Lake City

THE KANAB region of southern Utah and northern Arizona is a virgin oil and gas province. It includes some of the most spectacular desert scenery known to man, such as the rugged grandeur of Zion National Park in the heart of the region. While there are large areas with sheer cliffs and deep, narrow box canyons, far more country is accessible from existing roads than might be expected. Of more importance than the colorfully carved landscape, though, is the untapped oil and gas potential that might exist.

Stratigraphy

While the region has been referred to as the Kanab "basin," the use of the term basin appears to be incorrect. The writer's studies indicate that the region is neither a structural nor a sedimentary basin. Actually, it is a broad platform flanking the great Cordilleran geosyncline to the west, and is separated from the Kaiparowits basin by the Kaibab uplift on the east. The region is on the so-called "hingeline" that forms the eastern limit of the Cordilleran geosyncline. Prospect-



COLUMN of stratigraphic sequence denotes favorable oil and gas zones likely to be encountered in the Kanab region. Most of the Paeozoics are sufficiently buried to offer explorationists good promise. Several erosional unconformities are present but notably absent are any profound angular unconformities. It is probable then that structure at depth will conform generally with surface expressions. In low-dip areas, minor unconformities at depth could effect suitable oil and gas entrapment. Fig. 2.

ing for oil and gas has often been successful in areas wits similar geological circumstances.

The stratigraphic section for the Kanab region is shown. Mesozoic sandstones, siltstones, and shales form most of the surface exposures, masking the marine Paleozoic sediments that are of prime importance to oil and gas seekers. There are numerous erosional unconformities in the section, but profound angular unconformities are notably missing. Therefore, the structure at depth should conform, for the most part, with the structure expressed at the surface. In areas of low dips, however, minor unconformities at depth could effect the development of suitable oil and gas traps not evident on the surface.

Every Paleozoic system except the Ordovician and Silurian is known in the subsurface, and most types of marine and brackish-water sediments are represented. On the basis of existing information, it appears that, in descending order, the Timpoweap, Kaibab, Toroweap, Coconino, Pakoon, and Redwall offer the best potential for oil and gas production. The entire Paleozoic section thickens gradually toward the west, but is fairly uniform in thickness under most of the Kanab region. Since the region is marginal to the Cordilleran geosyncline, facies changes should be numerous in many of the Paleozoic formations.

The Timpoweap member of the Triassic-Moenkopi formation unconformably overlies the Permian-Kaibab dolomite, and is responsible for the oil production at the Virgin field. The Timpoweap, along with the Kaibab, is petroliferous at outcrops near the Hurricane Fault and in the Virgin River canyon. It was because of the oil seeps that the Virgin oil field was discovered in 1907. The Timpoweap and Kaibab have zones with good porosity, and together present one of the best objectives for oil and gas in the region. Underlying the Kaibab is the Toroweap formation, which consists predominantly of limestone, dolomite, sandstone, and anhydrite. Since several wells in southern Utah have encountered good oil shows in the Toroweap, it probably deserves more attention than it has received to date.

The Kaibab and Toroweap formations are similar in age and character to some of the Permian zones that are prolific oil producers in West Texas and New Mexico. The formations are within reasonable drilling depths under all of the Kanab region, and more often than not are above 5,000 ft. Around the Virgin oil field and south into Arizona the upper Permian formations are generally less than 2,000 ft. in depth. Oil shows have been encountered in other Permian zones, in-

cluding the Coconino and Pakoon, so it is apparent that the Permian alone offers many objectives for oil and gas.

Not to be overlooked, is the Mississippian Redwall dolomite and limestone. The Redwall is well developed under all of the Kanab region, and is similar in character to the Mississippian zones that produce oil and gas in southeastern Utah. The Mississippian would be fairly shallow in northern Arizona and adjacent parts of Utah, but farther north the zone would require deep drilling to reach.

The Devonian shales, dolomites, and sandstones that underlie the Mississippian are not well known, but they could also contain zones favorable for oil and gas. The basal sandstone of the Devonian in the region might be equivalent to the McCracken sandstone member of the Elbert formation in southeastern Utah. The McCracken sandstone has been publicized recently because of the oil production from it at Lisbon Valley in San Juan County, Utah. Only one test, the J. Ray McDermott 1 State, 2-43s-8w, Kane County, Utah, has penetrated the Devonian section in the Kanab region.

There is little likelihood that commercial oil or gas production could ever be established in beds older than Devonian in this region. It is interesting to note that the Cambrian formations overlie a thick sequence of unmetamorphosed Precambrian sandstones and shales. The true basement rocks would be several thousand feet deeper under most of the region.

Structure

The Kanab region has been subjected, for the most part, to only mild structural deformation. The great Cretaceous and Tertiary orogenies, which had a profound effect on parts of Utah and Arizona, were much less intense here. The region was tilted gently to the north, but this has been modified by broad warpings and numerous minor folds. There are several prominent surface anticlines that extend for many miles and have one or more structural closures. The accompanying map shows the structure of the region as interpreted from high-altitude aerial photographs. Only a few of the more favorable structures have been drilled for oil and gas, and some of the tests encountered good oil shows.

Most of the faulting occurred in the Tertiary, and, aside from the Hurricane and Sevier fault zones, was of a minor nature. The great Hurricane Fault separates the Kanab region from the structurally complex Basin and Range province to the west. The Hurricane and Sevier faults have displacements between 1,000 and 5,000 ft. and extend in a general north-south direction through much of northern Arizona and southern Utah. There has been recent movement on these faults as attested by earthquakes that have occurred since the pioneers settled in the area. The Hurricane and Sevier faults affect only a small portion of an otherwise stable geologic province.

There are lava flows on parts of the Markagunt Plateau in the northern part of the region, and volcanic cinder cones are common near the Hurricane and Sevier faults. The volcanic activity, though quite recent, is now extinct and has had little or no effect on potential oil and gas zones. There has been only localized deformation and practically no contact metamorphism as a result of the vulcanism. The lava flows are merely surficial coverings on a sedimentary section that is otherwise free of any evidences of volcanic activity.

Structurally the Kanab region is favorable for oil and gas accumulation. Anticlinal features exist that have not been tested for oil and gas, Most of the folding has been gentle, and nowhere has there been intense deformation, faulting, and mineralization

when you encounter excessive

TORQUE, DRAG

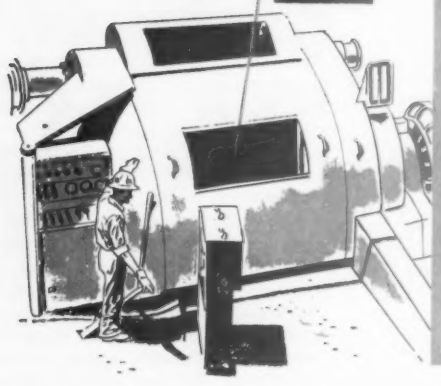
or the hazard of

STICKING

drill pipe and casing

SOUTHWESTERN

92 FLAKE GRAPHITE



- excellent dry lubricant
- inert
- compatible with any mud
- mud rheology unaffected
- mixes readily
- inexpensive
- minimum graphitic carbon 92%
- durable, weather-resistant 50-lb. bags

SOUTHWESTERN GRAPHITE COMPANY

Graphite Road Burnet, Texas

that would be detrimental to the occurrence of oil or gas.

Extent of Tests

There have been approximately 175 tests drilled in the region, although over 140 wells were shallow ventures concentrated in and around the Virgin oil field. Only three tests have been drilled into or through the Mississippian Redwall formation, and very few wells penetrated below the uppermost Permian zones. The three Mississippian tests are as follows:

Falcon-Seaboard 1 Antelope Springs, 28-40n-8w, Mohave County, Arizona. The test was drilled in 1956 on the Antelope Springs anticline in northern Arizona. The endeavor bottomed at 3,739 ft. after testing over 400 ft. of the Redwall formation. Aside from a slight oil show in the Coconino, there were no significant oil or gas shows.

Bardwell 1 Venton, 13-41s-12w, Washington County, Utah. This well, drilled in 1958, is the only deep test in the Virgin oil field. It was abandoned at 4,538 ft. in the Redwall after reportedly encountering oil shows in the Timpoweap, Kaibab, Pakoon, and Redwall formations. No attempt was made to complete the well as a commercial oil producer.

J. Ray McDermott 1 State, 2-43s-8w, Kane County, Utah. This well was recently drilled on a surface anticline just west of the Sevier fault. At the total depth of 10,502 ft. the test is probably in Precambrian rocks. Precise information has not yet been released, although it is reported that the Kaibab dolomite was topped at 4,845 ft. and the Redwall formation was encountered at 7,580 ft. There are unconfirmed reports of significant oil or gas shows in the Kaibab, Toroweap, Coconino, Pakoon, Redwall, and Devonian. At one time the well was a rumored discovery, which touched off an extensive leasing play in the area. Pipe was set and several deeper zones were perforated and acidized without success. There has been speculation about the presence of a heretofore unknown basin, hence the origin of the term "Kanab Basin," but the information available to the writer indicates a normal stratigraphic section and no evidence of a separate basin in the area.

Approximately 140 shallow wells have been drilled since 1907 in the area of the Virgin oil field, and about 30 have produced varying quantities of oil. The maximum daily production from any well was probably around 30 bbl. per day. The Virgin oil field is situated in a little synclinal pocket near the crest of a broad nose that plunges gently to the north.

The cumulative production from the field is around 200,000 bbl. of black paraffin-base oil that ranges in gravity between 24° and 36° API. There are four wells currently producing a small amount of oil in the field. All of the production is from limestones in the Timpoweap member of the Moenkopi formation at depths between 475 and 750 ft.

Since the producing formation comes to the surface just 2 miles southwest of the field, it is possible that much of the reservoir pressure has been dissipated and the oil has drained into low structural positions near the crest of the fold.

Aside from the activity in the Virgin oil field, very little drilling has been done in the region. Several tests have been drilled on the Antelope Springs anticline in Arizona, with good oil shows reported in a shallow well to the south of the area covered on the accompanying map. All of the oil shows encountered in wells in northern Arizona have been in the Kaibab-Toroweap-Coconino interval. Since most of the drilling in the region has been localized, the majority of southern Utah and northern Arizona remains totally untested for oil and gas.

Market Problems

The nearest oil pipeline is 75 miles to the south in Arizona, separated from the region under discussion by the Grand Canyon. The nearest large refinery is at Salt Lake City, some 300 miles to the north. The production at the Virgin oil field is refined into fuel oil and diesel fuel at a small topping plant located in the field. The topping plant is operated periodically and the products are marketed locally. The nearest railhead is at Cedar City, Utah, 45 miles by road from the Virgin oil field.

A proposed gas pipeline will cross the western part of the Kanab region and will provide an outlet for any commercial gas reserves uncovered by new drilling. Tests drilled to date have encountered little or no gas. The isolation of the region also presents problems for service companies and other third parties connected with the drilling of a well.

In summation the Kanab region has the necessary geological attributes to make it a commercial oil and gas province. Most of the region is accessible and drilling depths, for the most part, are within reason. Large areas offer very shallow objectives for small drilling rigs. The market situation is detrimental, but this could be eliminated with the discovery of a major oil or gas reserve.

Five Illinois basin counties show action

ILLINOIS basin activity includes developments in Gibson County, Indiana, White, Clay, Crawford, and Wayne counties, Illinois.

Indiana. In Gibson County, 3 miles southwest of Mackey, R. K. Petroleum Co. 1 Floyed E. Georges et al., NE NW NW 29-3s-9w, was completed on pump for 50 bbl. of oil, no water. Production is from Cypress sand at 1,592-1,606 ft. This well is ¼ mile north of the discovery well, 1 John and Herschel Georges in NE SW NW 29, completed last summer by Jackson and Wrather for 20 bbl. of oil and 20 bbl. water day from Cypress at 1,606-16 ft.

Illinois. In White County, 2 miles south of Mill Shoals in SE NE SW 31-3s-8e, Nation Oil Co. set casing at 2 W. P. McIntosh to test the Warsaw at 4,544-56 ft. Total depth is 5,455 ft. in the Dutch Creek Devonian. A drill-stem test at Warsaw depth got 150 ft. of oil, 15 ft. of oil-mixed mud. This was an old well drilled deeper. Old total depth was 4,191 ft. It produced from Warsaw at 4,165-74 and 4,178-87 ft.

In Clay County, Ivan White is drilling at 4,489 ft. at the 1 Colclasure in SE cor. NW SW 23-3n-5e, 7 miles west of Flora. This is a Devonian wildcat.

In Crawford County, 2 miles southwest of Robinson and ¼ mile east of the first Aux Vases well in the area, N. B. Smith 1 Stanley in NW NW SE 8-6n-12w, got 35 bbl. of oil and 15 bbl. water per day from Aux Vases at 1,527-32 ft.

In Wayne County, Texaco Inc.'s third Dutch Creek well 7 miles southwest of Fairfield is the 10 M. E. Heaton in NW cor. NE SE 17-3s-7e. Casing was set. Total depth is 5,368 ft.

Driller hits fifth straight Ohio strike

IN OHIO, Atlas Exploration Corp. has announced its fifth success with no failures in the gas play in north central Lake Township, Stark County.

The latest completion, 1 P. V. Bledsoe, Section 10, logged the Clinton sand at 4,501-66 ft. and gaged 300 M.c.f.d. natural and 2,814 M.c.f.d. after fracture with a rock pressure of 1,300 psi.

Summarizing the activity in this pool indicates seven wells completed, two by Belden & Blake. Shut-in volumes average 1,748 M.c.f.d. and rock pressures better than 1,300 psi.

BY C. O. NEWELL
Consultant, Olympia, Wash.

Eocene will be Oregon target

OREGON is to finally get an important test of Eocene sediments in the Willamette River Valley area.

Reserve Oil & Gas 1 Bruer spudded May 8 about 15 miles west of the state capital of Salem in the Yamhill River Valley, a tributary of the Willamette.

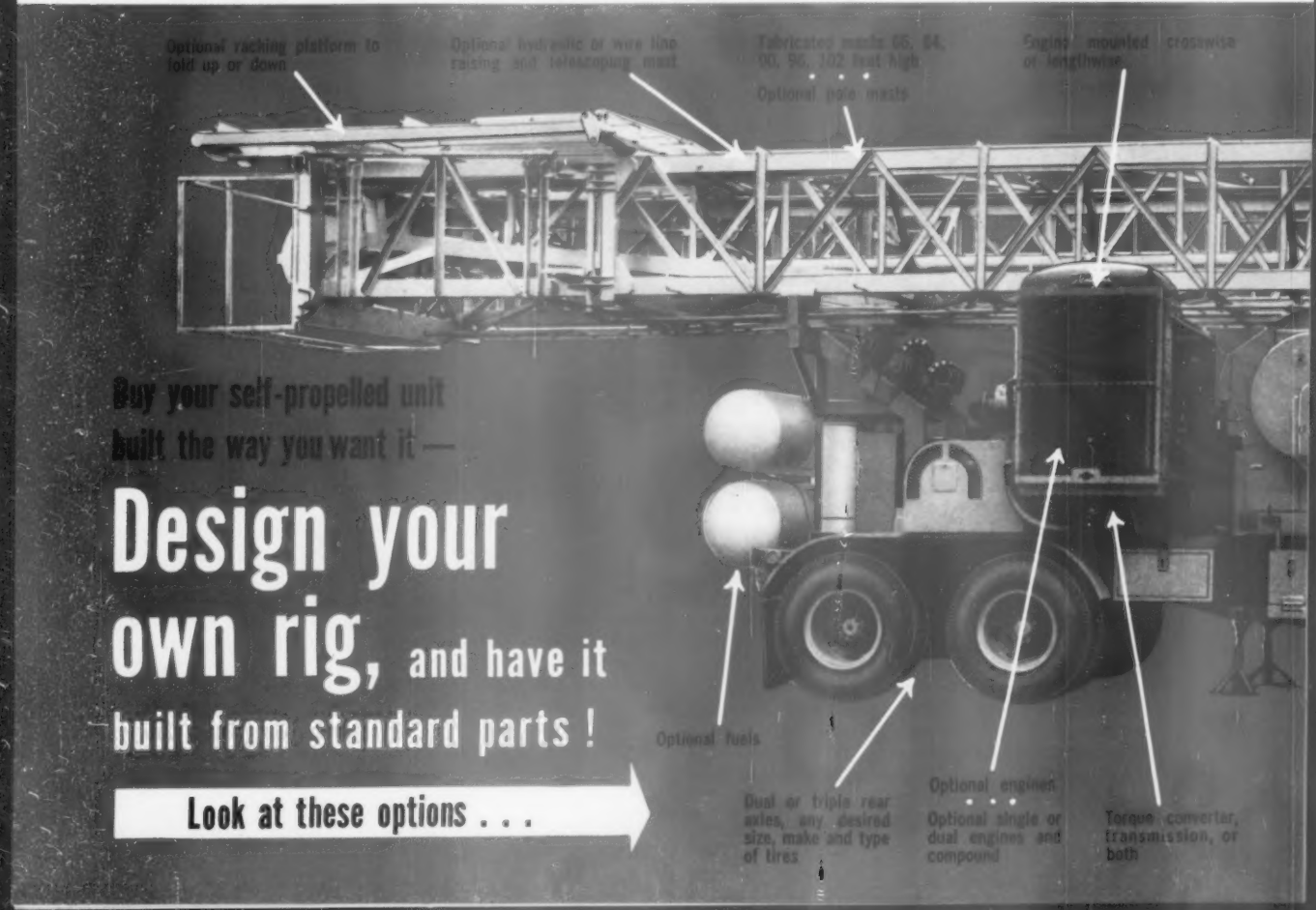
In a hitherto untested portion of the Oregon Tertiary basin, Reserve Oil & Gas, Bakersfield, Calif., intends to drill to Siletz River Volcanics (middle Eocene), generally conceded to be basement, at a projected depth of about 7,000 ft.; objectives of the test are Eocene sands.

CALIFORNIA company is drilling near Oregon's capital to test the middle Eocene.

Long wait. A test of sediments in the Willamette Valley is a long-overdue venture inasmuch as the Tertiary basin of Washington and Oregon is larger than any in California and is considered by most geologists to possess all the necessary characteristics for a major oil accumulation.

Oregon is a nonproducing state, primarily due to the lack of drilling and inadequate, poorly founded tests. In an area where geologic exploration programs are poorly understood or where such programs have ben absent, much of the drilling has fallen to locally organized stock groups who often refuse to seek competent geologic advice.

Not remote. The area is by no means primitive. The Willamette Valley is serviced by a first-class highway system, the core of which is two four-lane freeways which provide 70-m.p.h.


Optional racking platform to fold up or down
Optional hydraulic or wire line raising and telescoping mast
Fabricated masts 65, 84, 90, 96, 102 feet high
Optional pole masts
Engine mounted crosswise or lengthwise
Buy your self-propelled unit built the way you want it —
Design your own rig, and have it built from standard parts !
Look at these options . . .
Optional fuels
Dual or triple rear axles, any desired size, make and type of tires
Optional engines
Optional single or dual engines and compound
Torque converter, transmission, or both

RIGGING UP for a 7,000-ft. test of Eocene sediments in Oregon is a Western Drilling Co. crew.

travel through the valley between Portland and Salem. Farmers in the valley appear well-to-do, their equipment is new, their houses, barns, and silos are well-kept and painted, and their wives drive late-model cars. Because of the lack of exploration activity, however, geologists and oil companies are regarded with suspicion and mistrust. An increase in legitimate activity in this part of the basin would acquaint the local population with accepted procedures and practices. Eventually a feeling of trust and confidence in oil-company personnel would be established which would greatly aid the development of the area.

Education needed. If exploration activity is to increase, however, it is not entirely a matter of educating the local people. Company-management personnel who have spent virtually their entire lives in California and in the Rockies think of the Pacific Northwest as synonomous with basalt. The vast red area on the geologic map which frightens so many people lies across the Cascade Mountains some 100 miles to the east and constitutes the Columbia River basalt plateau. It is **not** a part of the western Tertiary basin.

Tertiary basin. The western Tertiary basin of Washington and Oregon is contiguous and is comprised of a total of about 26,000 sq. miles. The number of deep tests in this vast area can be counted on the fingers and toes and none have been such as to disprove an oil accumulation in the basin. The small number of tests is surprising in view of the fact that exploration costs are comparable to those in California, and considerably less than those in Alaska.

Geologic Sketch

The Willamette Valley in Oregon is limited on the west by the Coast Range Mountains and on the east by the Cascades. Most of the valley is covered by alluvium of the Willa-

Optional removable sand line drum
Air controls at choice of three positions
Optional spudder
Optional telescoping or non-telescoping mast
Wilson
Optional rotary drive
Optional reverse on rotary drive
Optional colors
Optional hydraulic swing drive with friction clutch
Optional steps and walkways
Optional 8 inch or 10 inch brake rings
Water circulating or splash cooled brakes
Single drum or double drum
Optional tool boxes
Optional hydraulic jacks
Optional cathead positions
Single or dual front axles
Drive in or back in carrier
BE MODERN — BUY WILSON
WILSON MANUFACTURING CO., INC.
Wichita Falls, Texas
The home of RED IRON

mette River and the smaller tributaries such as the Yamhill.

On the western margin of the valley, the oldest formation, the Siletz River volcanics (middle Eocene), form the backbone of the Coast Range. This formation consists of a series of submarine lava flows, pillow basalts, flow breccias and water-laid tuffs. Of unknown thickness, this volcanic series constitutes the basement unit in this portion of the Tertiary basin.

Overlying the Siletz series "with apparent unconformity,"[1] is the Yamhill formation (middle-lowermost upper Eocene) consisting of about 5,000 ft. of marine silts, intercalated sandstones and limestone lenses. Although generally tighter than those in overlying formations, sands within this unit are definitely capable of sustaining production.

The Yamhill formation is overlain unconformably by the Nestucca formation (basal late Eocene member) and consists of "more than 2,000 ft. of tuffaceous shale and siltstone and thin-bedded sandstone with intercalated pillow basalt, breccia, and tuff."[1] The volcanic rocks mentioned are restricted to an area 10 to 12 miles north of 1 Bruer, and will probably not be encountered during drilling. Sands within this formation are apt to be more porous than those in the underlying Yamhill formation and should be similar in character to the highly porous, soft, micaceous sands of the Cowlitz formation (upper Eocene) in Washington. They are prime objectives in any drilling program in the Pacific Northwest.

The tuffaceous buff-colored silts of the Keasey formation (lower Oligocene) crop out at the rig site and conformably overlie the Nestucca formation. The test should penetrate about 1,500 ft. of Keasey at this location. These soft weathering silts form the low, rolling, oak (and poison-oak)-covered hills which protrude through the valley floor. Dense underbrush effectively conceals many outcrops, hampers field work and shortens geologists' tempers. It takes a good deal of perserverance on the part of an experienced field geologist to work effectively in the area.

The original surface mapping on the northerly-trending anticline was done by Wesley Bruer, consultant in Bakersfield, Calif., who has spent a good deal of time in the northwest. Bruer was graduated from Oregon State College in 1950 and employed by Superior for 8 years. He worked in Texas, California, Wyoming, Washington, and Oregon before entering private practice as a consultant.

Bruer was enthusiastic about the anticline and the potential of the area and interested Gen. Fredrick L. Anderson, USAF Ret., and Lawrence Durig, Palo Alto and Edward H. Heller, San Francisco, in leasing the land, and in convincing Reserve Oil & Gas Co. that the structure should be drilled.

Enthusiasm. There are many geologists who share Bruer's enthusiasm for the area; from an exploration point of view the Willamette Valley portion of the Tertiary basin is attractive. Exploration costs are economic, a thick sedimentary series presents attractive objectives and drilling costs and problems are minimal.

It's time someone started looking.

Reference

1. Quoted and reference material from USGS Oil and Gas Investigations Map OM 155, "Geology of the Sheridan and McMinnville Quadrangles, Oregon" by E. M. Baldwin, R. D. Brown, Jr., J. E. Gair, and M. H. Pease, Jr.

Kentucky test completed

In Lawrence County, 5 miles northwest of Charley, Blaine Quadrangle, Kentucky, Crest Oil Co. has completed 1 Cordle for 468 M.c.f.d. of gas from Berea (Mississippian) sand. The Berea was topped at 1,073 ft. and well was drilled to 1,234 ft. total depth.

We all insure our valuable equipment against accidental damage or loss. Why not help insure expensive tubing and sucker rod strings against unnecessary wear and service by making a small investment in OIL STATES Rubber Sucker Rod and Tubing Guides?

IT JUST MAKES GOOD BUSINESS SENSE!

Invest a little to protect a lot. OIL STATES Guides protect your tubing and rods because they:

- **Prevent metal-to-metal contact between rods and tubing**
- **Centralize tubing in casing, minimizing "breathing" of tubing**
- **Lessen wear on pump by deadening "rod whip"**
- **Prevent paraffin build-up when properly spaced**

OIL STATES RUBBER SNAP-ON GUIDES ARE EASILY INSTALLED AS RODS AND TUBING GO INTO THE WELL. THEY DO NOT OBSTRUCT FISHING TOOLS.

"Oilfield Rubber Products Of Matchless Quality"

See your local OIL STATES Field Representative for additional information or write or call —

Oil States **OIL STATES RUBBER CO.**
P. O. Drawer 152 • Arlington, Texas

OSR-12

NW Oklahoma sets fast pace

DRILLING ACTIVITY continues strong in western and northwestern Oklahoma. In North Custer City field, Custer County, Mobil Oil Co. gaged 1,790 M.c.f.d. during tests of the Hunton Siluro-Devonian at 14,174-14,590 ft. at the 1 Webb in C SE NW 23-15n-16w. This indicated producer is in the deepest Hunton field in existence.

Oklahoma Panhandle. A new field in Texas County has its second well at Shell Oil Co. 1 Lundgrin in C SW NE 19-4n-17eCM. The well flowed 1,800 M.c.f.d. through ½-in. choke from perforations in the Upper Morrow Pennsylvanian at 6,192-6,227 ft. Shell's 1-24 Wright in C SW NE 24-4n-16eCM flowed 3,025 M.c.f.d. from Keyes Pennsylvanian at 6,493-6,500 ft. The third well in the field will be the 1 Finrock in C NE SW 18-4n-17eCM.

Texaco Inc. will dually complete at the 1 Schrauner in C NW SW 13-6n-10eCM. This Northeast Carthage field well found both oil and gas production in separate Morrow zones. The well flowed 2,740 M.c.f.d. from perforations between 2,961 and 3,045 ft.; it flowed 102 bbl. of oil in 7 hours through 2-in. tubing from 4,352-66 ft.

Carter Division of Humble Oil & Refining Co. 2 Mounts in C NE NE 35-1n-20eCM, Dower field well in Beaver County, swabbed 274 bbl. of oil from perforations in upper Morrow sand at 7,442-55 ft.

New gas test for California's Tehama

In California's Tehama County, Humble Oil & Refining Co. will drill a second well in its search for gas. Humble's Lyon Cattle Co. 2 will be a stratigraphic test in 26-26n-2w. The company drilled a 5,157-ft. dry hole in 30-26n-1w in 1958. The new well is about 10 miles northeast of Corning gas field, which is the northernmost field in North Central California.

Several strikes for South, Central Oklahoma

Good wells were reported in southern and Central Oklahoma last week.

Counties in the drilling scene are Love, Garvin, McClain, and Cleveland.

Love County. Texaco Inc. completed 1 Smith-Little in C E½ NE NE 18-7s-3e, Southwest Enville field, flowing 43,460 M.c.f.d. with a heavy condensate spray from Oil Creek sand

Operator Drills 170% More Footage, Increases Bit Life 67% With Seeco-Mul

Inherent Lubricating Qualities Also Broaden Use of Seeco-Mul As Effective E-P Additive

A division drilling engineer for a major in West Texas reported these significant figures after completing a 9,700' well with a Seeco-Mul mud. Oil-and-water emulsion drilling fluids are being used extensively by the division, and detailed records were maintained on both field and exploratory wells drilled with company rigs. Here's what Seeco-Mul did:

- *Increased bit life 67%.*
- *Increased footage per bit 170%.*
- *Increased penetration rate 66%.*
- *Saved $9,000 in one interval.*

Not only did they get the benefit of the extereme-pressure properties in Seeco-Mul, which extended bit life, but also attributed to the Seeco-Mul system were "a more nearly gauge hole, fewer round trips, less wear on the rig and equipment, more rig time in actual drilling, and less wear on pumps, liners, and the drill string."

On another test, this one a slim-hole, "the average rate increased 45% and the footage-per-bit increased 86% in a single 800' interval. Ten fewer bits were used, and 122 less rig hours, for an estimated savings of $7,500."

And here's what the company said about $2,540 spent for a product *specifically sold for bit lubrication:* "No increase in bit bearing life or penetration rate was achieved . . . on the basis of the test results (higher drilling costs with no improvement in bit life), further use was discontinued until more favorable results could be anticipated to justify the added expense."

Seeco-Mul, often run in so-called soap drilling fluids to lower the surface tension, is a chemical additive with superior wetting abilities. In addition, Seeco-Mul is an efficient E-P agent. It deposits an extremely tough lubricating film that will withstand high pressure and successfully reduce metal-to-metal contact of the bearing surfaces in the bit.

DRILLING PERFORMANCE IN 6⅛" HOLE

Well No.	H-4	D-2
Type Mud	Seeco-Mul CMC low solids	CMC low solids
Interval	9,999-10,787	9,999-10,803
Footage	788	804
Bits	8	22
Rotary Hours	126	210
Rotary and Trip Hours	174	342
Weight	35	25
RPM	38 to 50	60
Feet Per Hour	6.3	3.8
Feet Per Bit	98.5	36.5
Hours Per Bit	15.8	9.5
Penetration Rate Increase	65.8%	—
Footage Per Bit Increase	169.9%	—
Cost Per Foot*	$11.20	$22.54
Mud Cost (including mud-up)	$1,470.00	$1,150.00

*Total rig time × $45 per hour + number of bits × $124.30 ÷ interval footage.

Seeco-Mul is making hole faster and saving money for operators from the Gulf Coast to the Permian Basin. If you would like to report similar savings in rig time — increased bit life — more footage per bit — save rig hours — ask your local mud dealer about Seeco-Mul, or write to us for technical literature and a lab sample. We'll be glad to give you full particulars without obligation.

Make a good mud better . . . use

CROSSETT **Seeco-Mul** **DRILLING MUD ADDITIVE**

Manufactured by the Chemical Division of The Crossett Company, Crossett, Arkansas

Seeco-Mul is the dried flake form of a compound of the sodium salts of abietic, linoleic, and oleic acids, together with quantities of wood tannins and lignins.

Ordovician perforations at 8,550-8,640 ft. Flow was through 1-in. choke.

Garvin County. At Southeast New Hope field, Cities Service Oil Co. 1 Brown-K in C SW NE 16-4n-3w flowed 266 bbl. of oil in 22 hours through 15/64-in. choke from Third Bromide Ordovician sand at 9,266-9,345 ft. Both the McLish and Oil Creek sands were also productive.

McClain County. At Lindsay, Sinclair Oil & Gas Co. 2 Ellison, C SE NE 35-5n-4w, flowed 30 bbl. of condensate and 30 bbl. of water per day through ¾-in. choke and 1,300 M.c.f.d. during tests of the Oil Creek at 11,448-11,542 ft. Testing continues.

Continental Oil Co. 1 Moore in C E½ SW SE 32-6n-2w, a second well in the east extension area of Flint Creek field, flowed 141 bbl. of oil per day on 19/64-in. choke from Bromide sand at 8,395 to 8,408 ft. This well confirms the new-pay discovery recently completed in the area.

Cleveland County. At South Norman field, Red Fork Pennsylvanian saand may be a producer at Anderson-Prichard Oil Corp. 1 Norman in NE NE NE 18-8n-2w. Recovery was 3,030 ft. of gas, 90 ft. heavily oil-cut mud, 90 ft. of oil and salty mud, and 150 ft. of oil. The discovery well of the field, Pure Oil Co. 1 Valouch in SE NW NW 17, tested at 7,213-23 ft. Recovery was 135 ft. of oil and 50 ft. heavily oil-cut mud. Completion, however, was in the Wilcox and Tulip Creek Ordovician sands.

Sooner section of Arkoma gets gas hit

Southeastern Oklahoma's portion of the Arkoma basin picked up another good gas well. The new producer is the second well at Northwest Kinta field in Haskell County.

Ambassador Oil Corp. completed 1 Butler in NE NE SW 11-8n-19e, north of the Apache Oil Corp. discovery well. Flow was 2,415 M.c.f.d. from basal Atoka Pennsylvanian sand at 5,751-62 ft. Shut-in tubing pressure registered 1,250 psi.

Apache is drilling south of the discovery well of the field, and also to the southwest.

New pool find, dual completion at Vernalis

Great Basins Petroleum Co. gave the hot Vernalis gas field in San Joaquin County a new pool in a dual completion on the north edge of the producing area. The discovery, 63-16 Mohawk-Boltzen-Hunter, was completed in the field's Blewett 1 sands as a development well and in the Ragged Valley Silt as a new pool discovery. Total initial production was 4,500 M.c.f.d. through a ⅜-in. choke. No figures on perforated intervals of either zone were released. Total depth of the well is 5,050 ft.

Louisiana wildcat is good producer

A WILDCAT in the Sardine Point area just west of the old Burtville field in southwestern East Rouge Parish, below Baton Rouge, in southeastern Louisiana appears to be making a good oil producer.

Production tests by The California Co., the operator, got a flow of 240 bbl. daily through 8/64-in. choke with pressure of 1,375 psi. and gas-oil ratio of 641 cu. ft. per bbl. Production is from a depth of 9,697-84 ft. Total depth is 11,000 ft.

The well, 1 Mrs. Phillips Ferro, is on the east bank of the Mississippi River.

Burtville field was opened in 1950 and has 12 wells with production at depths of 9,500 to 10,800 ft.

WORK HORSE

The JENSEN Rotary Balanced JACK is built to work for years and years. It's rugged. Has larger, heavier main shafts and bearings.

Taller and more rigid samson post. Simplified installation with complete floor clearance. This JENSEN R-B JACK is a work horse that's economical to buy and operate. Get the details on it and other money-making JENSEN JACKS before you buy any pumping unit.

STOCKED BY YOUR LOCAL SUPPLY STORE

Made by JENSEN BROS. MFG. CO., INC., P. O. Box 477-F, Coffeyville, Kansas
Export Office: 250 Park Avenue, New York 17, N. Y. U.S.A.

JENSEN JACKS

ANY MAN CAN WEED-PROOF 10,000 SQUARE FEET IN TEN MINUTES...with UREABOR

–just apply **UREABOR**® *and you can forget about weeds for the season!*

Think of the savings—in time *and* money—this weed killer offers you! UREABOR is the special granular weed killer meeting all requirements of industrial users. A little does a lot! One DRY application of only 1 to 2-lbs. per 100 sq. ft. creates weed-free areas anywhere for a whole year! UREABOR is safe, effective, economical and convenient. It's always ready for use direct from the bag—in the easiest possible way—to destroy weeds and protect your property from grass fires.

A SPECIAL SPREADER simplifies and speeds UREABOR applications at low rates with accuracy. Spreader holds enough UREABOR to treat 1250 sq. ft. without refilling; weighs a mere 6 lbs. Width of the swath can be adjusted.

UREABOR IS 2 HERBICIDES IN 1... The plant-destroying powers of 2 proven herbicides are combined in this granular complex of sodium borates and substituted urea (3-P-Chlorophenyl, 1-1, dimethylurea) to yield superior, non-selective results.

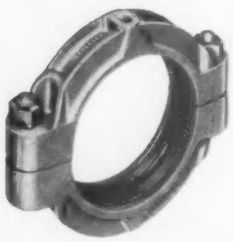
STANDARD PACKAGE IS 50 LBS. UREABOR is packed in multiwall paper sacks for easy handling—easy storing. A convenient package, easily disposable, for spotting at predetermined intervals to facilitate large-area applications.

Write for literature: **UNITED STATES BORAX & CHEMICAL CORPORATION**

630 SHATTO PLACE • LOS ANGELES 5, CALIFORNIA

Wherever oil flows... There's a Dresser® quality piping product that's right for the job

FOR GROOVED END PIPE



Dresser "KUPL + LOK" (TM) Couplings and Fittings, 500# & 1000# types.

FOR PLAIN-END PIPE

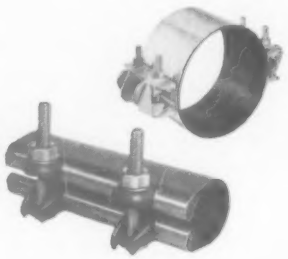
Style 40 Long Sleeves for spanning gaps between pipe ends.

Style 38 Couplings for regular applications.

FOR SMALL DIAMETER PIPE

Dresser Compression Couplings and Fittings . . . Sizes thru 2".

FOR PIPE REPAIRS



"360" Clamp for Asbestos-Cement Pipe
"Handiband" Clamp for Steel Pipe

All the pipe joints you need for fast installation on tank batteries, gathering lines, mud pumps, salt-water disposal lines . . . now in stock at your supply store.

All the easy-to-install, permanent repair products that enable you to stop leaks fast . . . now in stock at your supply store.

Insist on Dresser quality when you buy pipe couplings, fittings and repair products. Every Dresser product is clearly marked . . . your guarantee of highest quality.

Bradford, Pennsylvania
Chicago
Houston
New York
S. San Francisco
Toronto & Calgary

DRESSER MANUFACTURING DIVISION

ONE OF THE DRESSER INDUSTRIES

Dual completion for offshore Louisiana

SEVEN oil and one gas sand with a net total thickness of 176 ft. were logged in a new dually completed offshore discovery well drilled by Ocean Drilling & Exploration Co. in South Pelto Area off the coast of Terrebonne Parish, Louisiana.

The well, 2 OCS-073, is in Block 19, adjoining on the east production in South Pelto Block 20 field. Location of the new development is 12 to 15 miles from shore. Odeco, the operator, is a partner with Murphy Corp., and the Burmah Oil Western Co.

Completion is in the lowermost two sands. The shallower is perforated in two intervals at 8,352-58 ft. and 8,361-67 ft. The other is perforated at 8,443-50 ft.

Both of these sands are oil-productive and new pays for the field. The upper tested 241 bbl. daily, flowing through 10/64-in. choke with pressure of 1,160 psi. and gas-oil ratio of 682 cu. ft. per bbl. Gravity is 33.5°. Flow from the lower zone was 278 bbl. daily, same choke, with pressure of 1,460 psi. and ratio of 755 cu. ft. per bbl.

Hole had been drilled to 8,775 ft. before the well was completed.

South Pelto Block 20 opened in 1951, is one of the older—but not extensively developed—Louisiana's offshore fields. It was discovered by Magnolia Petroleum Co., predecessor of Socony Mobil Oil Co., which also is drilling in the area. It now has four producible oil wells.

Michigan well deepened to new pay

Robert Bond 1 Van Antwerp, SE SE SE 19-20n-10w, Burdell Township wildcat, Osceola County, deepened from dissipated Dundee pay at 3,683 to 3,804 ft. and picked up good gas-oil section in the Reed City dolomite. Well flowed 220 bbl. on ¼-in. choke from 5-in. casing in 20 hours.

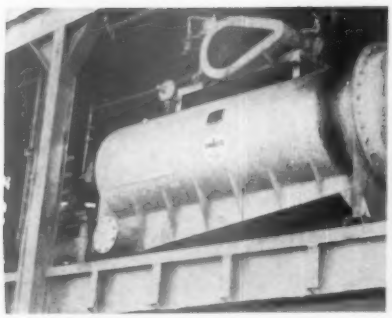
The test, 11 miles north of Reed City field (Traverse, Dundee and Reed City oil pays), was rated a discovery last December at 127 bbl. a day but production declined rapidly along with increasing water cut.

Quarter-mile offsets east and west were drilled by Sun Oil Co. and Gulf Oil Co. early this year. Both were abandoned but Gulf did not reach the pay depth now under development by Bond.

Covey and Null 1 Hiller, NW NW SW 4-8s-2w, Ransom Township, Hillsdale County, on drill-stem test at

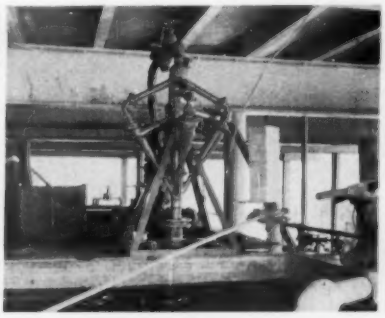
Three good ways to cut drilling costs

The three units shown here are important items behind the recent revolution in drilling fluids that has done so much to speed drilling and cut costs. Each is designed for a different problem but all are efficient and economical. Equally important, all are handled by SWACO -- the leader in mud-treating equipment.



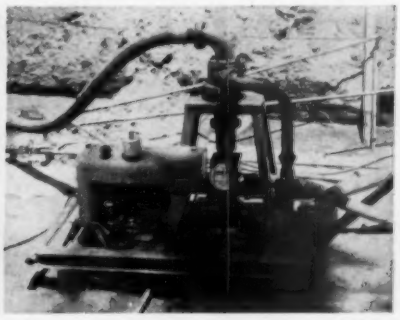
SWACO D-GASSER®

Operators frequently report saving the entire rental cost of a D-Gasser on a well in less than a day.
When mud is gas-cut, the D-Gasser saves money in many ways. It cuts time lost for circulating after trips. It reduces barite costs, it minimizes lost circulation costs and problems. It maintains mud pump efficiency and it actually makes possible the close control of mud weight and viscosity that results in faster drilling with increased safety.



CLAYJECTOR®

If you are using mud as heavy as 12 pounds per gallon, you can cut mud costs and increase drilling rate by using a Clayjector. This is a cyclone-type separation unit that is extremely effective at rejecting unwanted clays and retaining expensive barite.
In addition, since it makes possible the economical maintenance of a low-solids, low-viscosity mud, it actually permits a reduction in bit costs and drilling time.



D-SANDER®

The D-Sander greatly increases the life of mud pump parts and bits when sand or abrasive shale is being drilled. Since it removes virtually all sand-sized solids from the mud, excessive pump-parts and bit-nozzle wear — as well as many other problems — are avoided when a D-Sander is used. There is a size and type to fit every rig and drilling condition.

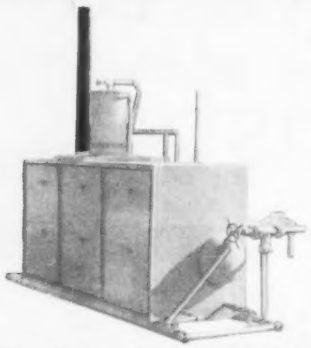
These descriptions tell just a few of the many ways you can cut costs by mechanical mud treating. For the full story on how you can profit, call your nearest SWACO representative or write us direct.

SWACO

SALT WATER CONTROL, INC.
1809 CONTINENTAL NATIONAL BANK BLDG., FORT WORTH 2, TEXAS
Telephone: EDison 2-4433 Cable Address: "SWACO" Fort Worth

LOUISIANA: New Orleans, Lafayette
OKLAHOMA: Oklahoma City
TEXAS: Houston, Corpus Christi, Fort Worth, Kermit
COLORADO: Durango

SAUDER HD-1 UNIDRYER



THE FINEST GLYCOL-TYPE GAS DEHYDRATION UNIT ON THE MARKET TODAY! Assures better gas-glycol contact . . . less glycol loss . . . greater flexibility with: less maintenance and easier maintenance. Units COMPLETELY WINTERIZED for cold-weather operation. We welcome your inquiries. Write or phone us today for complete information.

Sauder SAUDER TANK CO., INC.

PHONE DI 2-2550 • EMPORIA, KANSAS

EMPIRE SAND SAMPLE ENVELOPES

Specially designed and manufactured for storing sand samples. They will last and serve for years. Immediate delivery of any quantity.
PRICES AND SAMPLES ON REQUEST

32 # KRAFT RUSTPROOF FLEXIBLE METAL TIE

SAND SAMPLE BOXES

Corrugated and solid Kraft Fiber Boxes for storing sand samples. Carried in stock.

Core Boxes built to specifications

TULSA PAPER COMPANY

TULSA PAPER CO.
P. O. BOX 30 TULSA 1, OKLA.

1,755-65 ft. in the Niagaran section showed 50 M.c.f. of gas. Drilling will continue to the Trenton.

Big find for Texas Panhandle

Texas' Panhandle has its major discovery of the year. Location is 20 miles south of nearest production in Hemphill County. Discovery well is Gulf Oil Corp. 1-A Bowers in the southeastern part of the county, 22 miles southeast of Canadian.

An official calculated open flow of 27 M.M.c.f.d. was reported with a shut-in pressure of 6,705 psi. Flow is natural through tubing set to 11,748 ft. on the outside of 4½-in. drillpipe which was at total depth 13,611 ft. The pipe stuck and wasn't recovered. Production is from what is believed to be Pennsylvanian granite wash. Tops include: Red Cave 2,538 ft., Pennsylvanian lime 3,361 ft., Brown dolomite 4,270 ft., Douglas 8,080 ft., Tonkawa 8,850 ft., Cleveland 10,365 ft., and Granite Wash at 11,250 ft.

Louisiana's Bayou Chevrul gets third completion

Year-old Bayou Chevrul in northern Lafourche Parish, southeastern Louisiana, is getting another boost with completion of its third well.

The new producer, one of three active drilling operations J. C. Trahan Drilling Co. and Hope Natural Gas Co., joint operators, have had in the immediate area, flowed 348 bbl. of 49°-gravity condensate with 5 M.M. c.f.d. of gas from perforations at 12,523-25 ft.

Flow was through ¼-in. choke under pressure of 3,900 psi. Hole had been drilled to 13,215 ft.

Location is 3,000 ft. east and a little north of the field's two previously completed wells.

Discovery well, drilled by Shoreline Drilling Co., was completed in May 1959. It was rated at 85 bbl. of 47.9°-gravity condensate and 2,060 M.c.f.d. of gas through 10/64-in. choke from pay at 12,980 ft. Second well was completed last month in pay at 12,422-28 ft.

The Trahan-Hope well is designated as 3 Bowie. Their other two drilling operations are 1 City of New Orleans, about a half mile farther east of the new producer, and 1 Beatrous, southwest of the field.

U. S. MULTIPLE COMPLETIONS MAY 1960

	DUAL	TRIPLE
Arkansas*	..	..
Illinois†	3	9
S. Louisiana‡	19	2
Offshore Louisiana	7	3
Mississippi	2	..
Montana	1	..
West New Mexico	5	..
East, New Mexico	1	..
Oklahoma	16	..
Texas	50	2
Dist. 2	7	..
Dist. 3	6	..
Dist. 4	9	1
East	5	..
West	14	1
Dist. 9	7	..
Dist. 10	2	..
Total United States	104	16

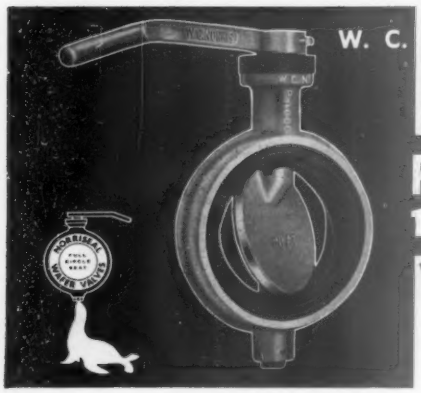
* Includes one quadruple. † Includes four quadruples. ‡ Includes one sextuple.

Gas-condensate hit for offshore Louisiana

A wildcat drilled by Shoreline Exploration, Inc., 4 miles northeast of the spreading multiple-pay Johnson Bayou field in far-southwestern Cameron Parish, coastal Louisiana, is being completed as a new gas-condensate discovery well.

The well, 1 M. E. Mair, made a good flow while cleaning through 12/64-in. choke. No gage was taken of the flow but flowing pressure of 2,800 psi. was recorded. The well has been shut in pending potential tests.

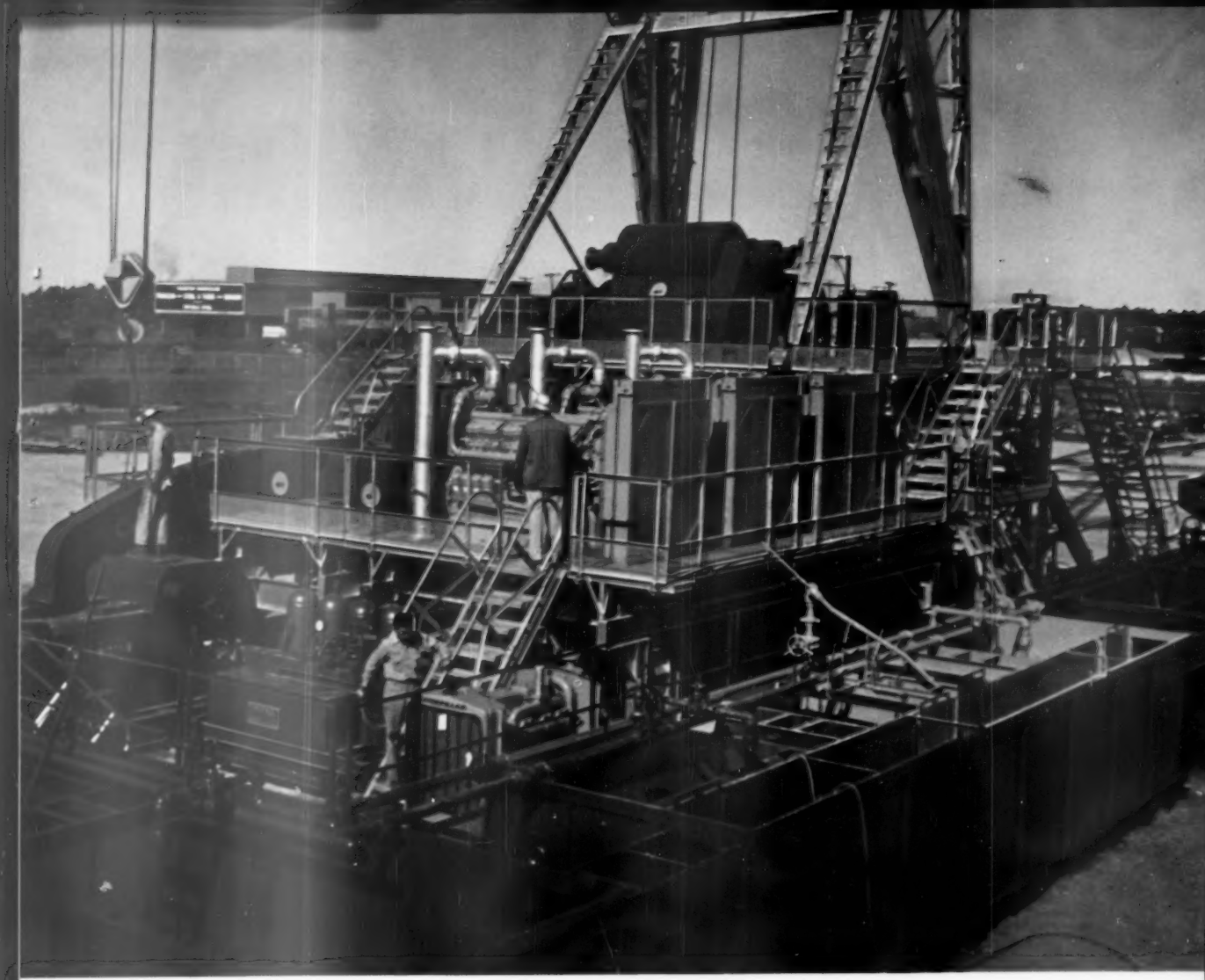
Production is from sand perforated at 7,665-61 ft. in hole taken to 11,500 ft.



W. C. NORRIS VALVES

Field Tested and Approved
150 psi working pressure

WRITE FOR NEW VALVE BULLETIN
P. O. Box 1739, Tulsa



This is a complete rig-up of a National Supply rig before shipment from Houston, Texas.

National Supply's Rig-Up Service pays for itself by eliminating problems at the well site

National's optional rig-up service can prevent many costly problems with rigs destined for domestic or overseas service. National Supply facilities and crews at Torrance, Calif., and Houston, Texas, are available for complete assembly of the rig, test operation, lubrication and adjustment. This service is your assurance that field assembly will be fast and 100% effective. It pays off by preventing delays when downtime can ruin a schedule. Your National Supply representative will be glad to discuss the details of this self-liquidating service with you.

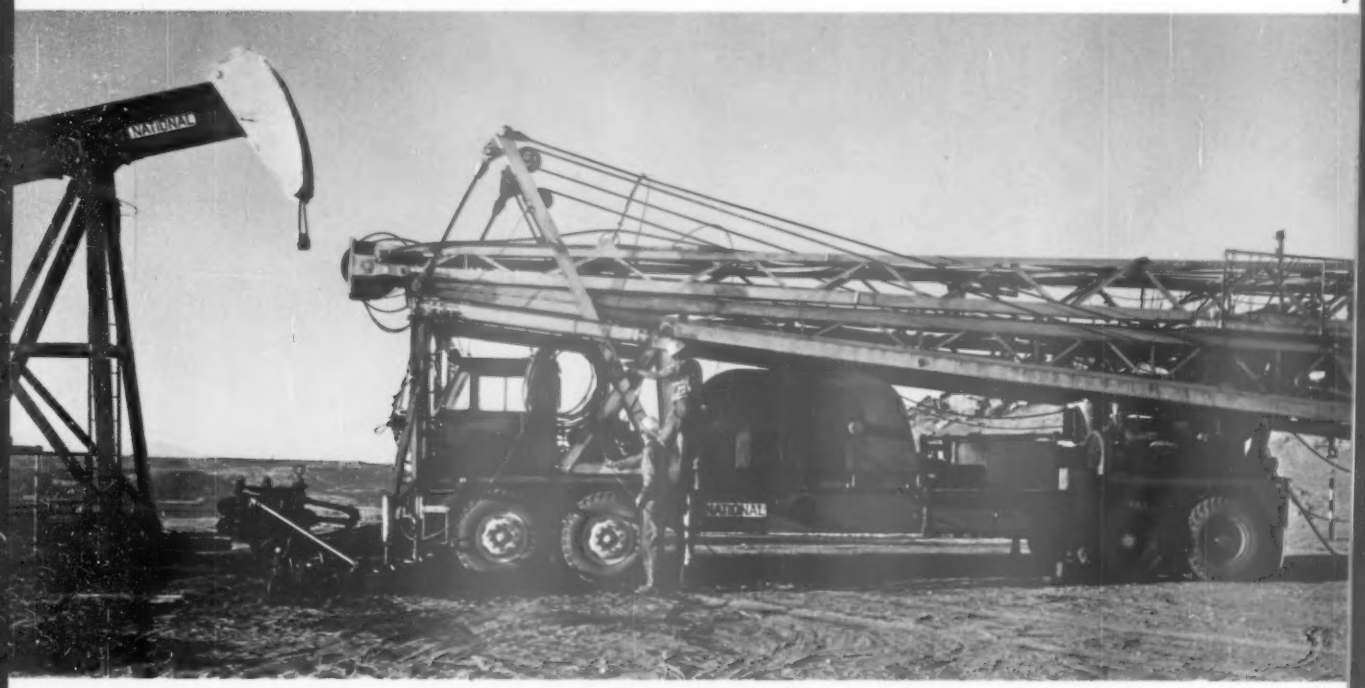
See next pages for information on National Self-Contained Rigs

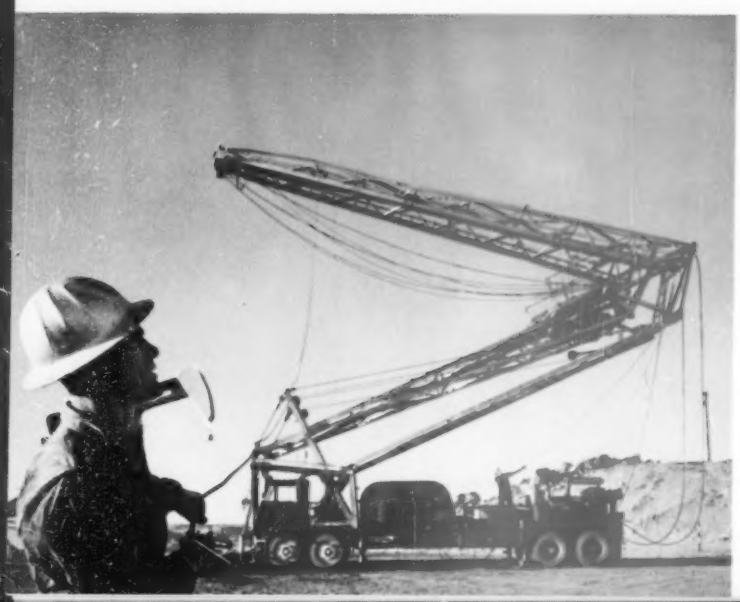
National's SELF-CONTAINED Drive-In Rigs set new standards of portability, speed, safety

Balance, modern design, conservative ratings and accessibility of all working parts . . . these are a few of the many reasons why National's *Self-Contained* Drive-in rigs are superior.

Both National Supply self-propelled Drive-in rigs, the Model 200 and Model 300-B, are carefully engineered for every oil country job from rod and tubing servicing to deep workover.

The action picture story on these pages points out only a few of the features of National *Self-Contained* Drive-in rigs. Write for complete information, or call your National Supply representative for details.





1 This National Model 300 Drive-in rig is pulling into location on a remote Colorado drilling site. Roadability and ease of handling of these rigs are due to heavy duty tandem front axles, power steering, and modern Eaton tandem driving axles.

2 Here the folding-type mast is being raised to the vertical position. This mast requires no ground guys, and folding outriggers on the mast superstructure provide stability. Other types of masts are available, depending on customer's preference.

3 The mast is now in vertical position with a minimum of effort or time. Mast clear-heights for the two models are: Model 200—88′5″ and Model 300-B—96′6″. Hydraulic mast erection systems are standard on both Drive-in models.

4 Crew is now ready to start raising tubing. Note the compactness of the National rig. Model 300-B dimensions are as follows: overall length, 49′; width, 8′; wheelbase, 25′. Model 200 dimensions are: overall length, 45′; width, 8′; wheelbase, 19′.

5 This is a side view of the Drive-in rig in place. Hoist controls are extremely convenient and are normally mounted on the right hand mast outrigger. Ample air compressor and air reservoir capacity for rig and vehicular operation is provided. A hydraulic system for tubing tongs is available.

6 Work over and tie-in with tank battery are completed. Both the Model 200 and 300-B are equipped with sand reels of large spooling capacity. Brake rims and blocks on the main and sand reel drums are interchangeable. Although unit is light weight for maximum portability, solid construction assures complete safety in all operations.

Steel

Steel's Symbol of strength, long life, and economy

See next page for information on new T-45 rig

Total flexibility of power and portability are features of this 550-horsepower T-45 drilling rig recently shipped to Libya. The rig is transported on six trailers and is the largest and most powerful ever designed for fast transportation in desert areas by the National Supply Company. All trailer wheels are equipped with extra size desert-type tires. As shown above, the rig was rigged-up and test operated at National Supply's Houston, Texas, plant prior to shipment.

New National T-45 Rig is compact, versatile ... specially suited for trailer mounting

National Supply's new T-45 rig features compactness, light weight and simplicity of construction. The rig is "tailor made" for fast, efficient drilling operations, having automatic, safe and precise air controls for hoisting, braking and rotating functions.

It is designed for use with torque converter equipped engines. The T-45 rig may be powered with one or more engines developing a total of 450 to 600 horsepower. Although the T-45 is offered as a conventional skid mounted drawworks, it is especially suited to trailer mounting. Here are a few of the T-45 features:

AIR OPERATION gives precise, synchronized power. Dependable pneumatic equipment gives accurate control of the compressed air power, fully protects the rig for safe operation.

STREAMLINED CONTROL PANEL simplifies operation, makes it safer, more precise. Easy-to-reach levers make it easy for operator to control each phase of the drilling cycle.

WATER JACKETED BRAKE RIMS give efficient, continuous cooling, and the large main drum affords longer wire line life.

TORQUE-CONVERTER EQUIPPED ENGINES permit faster round trips, better pump performance and improved rotary operation.

Write for complete details on new T-45 rigs in Bulletin 504, or call your nearby National Supply representative.

THE NATIONAL SUPPLY COMPANY

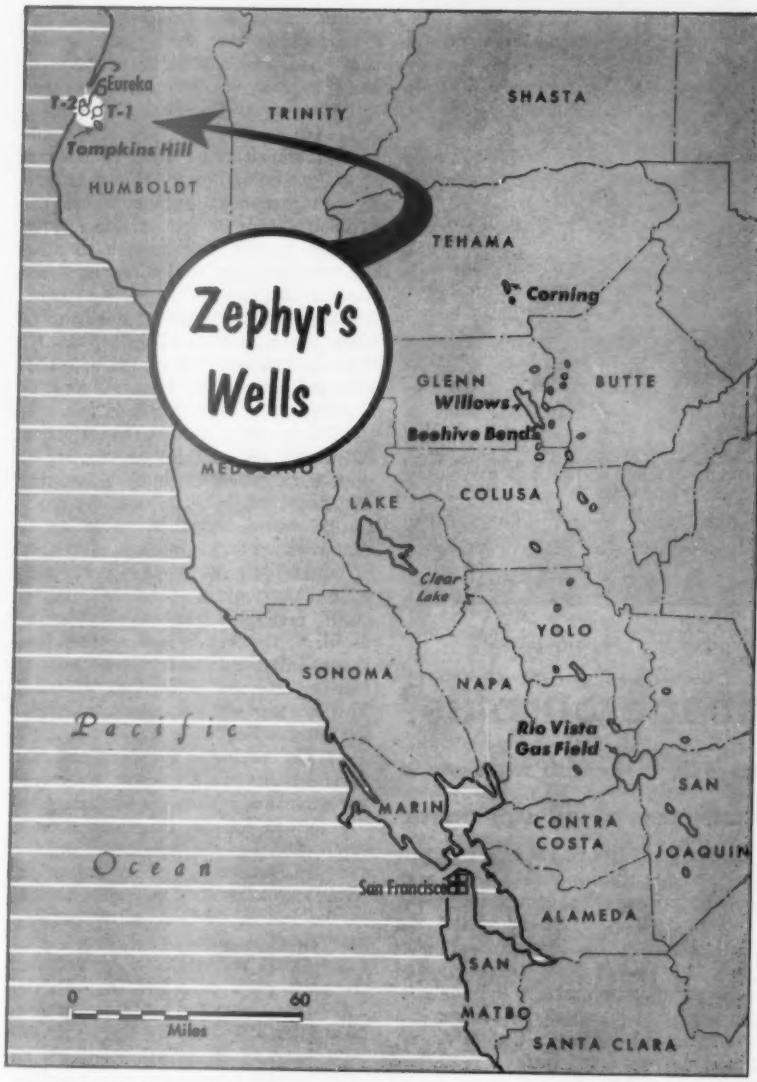
Two Gateway Center, Pittsburgh 22, Pennsylvania

Subsidiary of Armco Steel Corporation

DIVISION OFFICES: Calgary, Columbus, Dallas, Denver, Houston, Torrance, Tulsa

EXPORT: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; City Wall House, Chiswell Street, London E.C. 1

Printed in U. S. A.



TEASING SHOWINGS build hopes for discovery of new gas field in California's north coastal Humboldt County. Second test to drill north of remote nearly depleted Tompkins Hill field.

Gas tests continue in northern California

In California, Zephyr Oil Co., Long Beach, is planning a second well along the northern coast in Humboldt County after coming up with noncommercial shows of gas in its first test.

The drilling program is in the extreme northern section of California less than 100 miles from the California Oregon border. It is about 3 miles northwest of the nearly depleted Tompkins Hill gas field and about 125 miles northwest of established gas production at Corning field in Tehama County.

Zephyr's first well, the Leon Oro Blanco T-1 in 6-3n-1w, had noncommercial shows in a perforated zone at 5,590-5,652 ft. The operators are moving up the hole to test other zones.

The company plans to move the rig 2,000 ft. west of the T-1 to drill the Leon Oro Blanco T-2. Ben Owens Drilling Co. has the contract.

Discovery wells

ARKANSAS

Johnson County:

Stephens, Inc., 1 Taylor Landthrip, 22-10n-23w, 2¼ miles north of Clarksville. IP 880 M.c.f.d., calculated open flow, shut-in TP 1,380 psi., perf. 3,536-60 ft., Atoka. TD 4,841 ft. Discovery well of Ludwig field.

Lafayette County:

C. G. Davis 1-A Moore Estate, 3-16s-25w, 2½ miles northeast of Garland City. IPP 40 BOPD, 18.5°, GOR 200 cu. ft. per bbl., perf. 2,996-3,008 ft., Tuscaloosa. TD 3,242 ft. Extension and new pay in New Garland City field.

Pope County:

Humble Oil & Refining Co. 1 John P. Graham, C NE NW SE 19-9n-19w. IP 12 M.M.c.f.d., calculated open-flow potential, shut-in TP 1,650 psi., perf. 3,992-4,015 ft. Hale sand. TD 5,000 ft. New pay in Dover field.

Union County:

McCombs Hardy et al. 1 Olin Oil & Gas Corp., 8-17s-13w, 2½ miles northwest of Wilmington. IPP 27 BOPD (net), 15% b.s. and w., 16°, perf. 2,754-56 ft., second Graves sand. YD 3,670 ft. Discovery well of Cypress Creek field.

CALIFORNIA

Los Angeles County:

Standard Oil Co. of California 306 Marlow-Burns in 16-2s-14w, 464 BOPD, clean, 29° gravity, 480 M.c.f.d., TD 8,764. (New pool discovery on south edge of Inglewood field.)

San Joaquin County:

Porter Sesnon and Great Basins Petroleum Co., et al., 63-16 Mohawk-Boltzen-Hunter Unit 4, NE SE 16-3s-6e, dual completion, 4,500 M.c.f.d. total production from Ragged Valley Silt, a new zone, and Blewett No. 1 sands, TD 5,050 ft. (New pool discovery on the north edge of Vernalis field.)

COLORADO

Mesa County, Shire Gulch Unit.

Compass Exploration Inc. 1 Government, Lot 4, NW NW 6-10s-96w. IPF 1,812 M.c.f.d., Corcoran 2,778-2,848 ft. TD 3,631 ft. Mesaverde discovery, new field.

Weld County:

Wentworth Drilling Co. 1 W. A. McEndaffer, C NW SW 20-11n-56w. IPF 1,500 M.c.f.d., Shut in "J" sand gas discovery, new field. TD 6,310 ft.

Yuma County:

S. D. Johnson et al. 1 State, SW SW 16-2n-42w. IPP 11 BOPD, Lansing-Kansas City discovery, new field. TD 5,200 ft.

SOUTH LOUISIANA

Cameron Parish:

The California Co. 1 State Lease 3463, Sabine Lake. IP 250 M.c.f.d., dry gas, 10/64-in., TP 750 psi., perf. 11,320-30 ft. TD 14,094 ft. New-field discovery.

Aluminum Co. of America 1 F. A. LeBleu, 11-8s-5w. IP 72 BOPD, 5/64-in., 48.5°, TP 5,000 psi., GOR 8,819 cu. ft. per bbl., perf. 10,014-19 ft. TD 10,021 ft. Confirmation well and new pay in East Fenton field.

NEBRASKA

Kimball County:

Wyoming Western Oil Co. et al. 1 Chamberlain, C NW SW 26-14n-58w. IPP 276 BOPD, "J" sand oil discovery, new field. TD 7,245 ft.

(Continued on page 199)

Thornton F. Bradshaw . . . he shocked the company lawyers.

How Do You Manage Surplus?

• That's oil's big problem, says T. F. Bradshaw, who in only 4 years has become a controversial industry figure.

THORNTON F. BRADSHAW, Atlantic Refining Co.'s vice president and general manager of finance and accounting, has, by his own admission, only one friend in the oil industry.

This friend is Shaik Abdullah al-Tariki, Saudi Arabia's director general of petroleum and mineral affairs. Those who heard Bradshaw speak at the annual meeting of security analysts in New York late in May know why. He predicted that "control of the (oil) surplus of some sort or another will become effective and in the relatively near future" (OGJ, May 23, p. 83).

This was right down the line that Tariki and Perez Alfonzo, Venezuela's minister of mines and hydrocarbons, have taken. Bradshaw was the first and, so far, the only, U. S. oil man to voice any agreement with that view.

Ten days later he addressed the API Division of Finance and Accounting, also in New York. He had learned since he spoke to the analysts, he said, that international control is a controversial subject. "Our lawyers," he said, "were so shocked that they turn their backs when they see me in the hall."

Between the analysts meeting and the API session, Bradshaw had dinner with Tariki. During the meal Tariki said to his host, "You're one of the few friends I have in the oil industry." Bradshaw replied, "You're the only friend I have in oil."

Bradshaw's remarks on controls got the headlines and, as he readily admits, made him a controversial figure. But the limelight obscured some other things he said. For example:

. . . **On oversupply:** "The oil surplus is real and it must enter into your thinking and into mine, but I submit to you that in a broader sense the problem is not do we have too much oil, but do we have enough to meet the tremendously expanding needs of the world?

"The immediate problem is one of management of our riches, and I would much rather be faced with that problem than with the problem of creating riches out of poverty. . .

"The problem is not the existence of surplus oil. I think we can offer up a short prayer of thanksgiving that we have enough oil to meet the needs of the world and then move on to deal with the real problem, and that, of course, is how to manage the surplus.

"If managing the surplus is the problem, the key question then is—When will the industry learn how to manage this new kind of oil industry? The question is not, How long will the surplus last?"

. . . **On timing:** "By 1957 all the basic factors were present to create an explosion. Two events triggered off the explosion: the unexpectedly rapid ending of the Suez crisis and the 1957-58 general economy recession.

"Stocks of major products soared in the fall of 1957 to all-time highs and product prices collapsed. The Gulf Coast refiners' margin dropped from its peak of $1.08 in April of 1957 to a low of 41 cents exactly a year later.

"I have reached back into this bit of sad history to illustrate two points: One, the rapidity with which those events occurred; two, the fact that oil managements have had very little time to learn how to manage in a world of surplus."

Rapid rise . . . Bradshaw is a squarely built individual, but there's nothing

▶▶▶ Personals

J. Paul Jones, Bradford, Pa., has been reelected president and executive manager of Pennsylvania Grade Crude Oil Association. **George J. Hanks,** South Penn Oil Co., Oil City, Pa., has resigned as first vice president but will continue as a director. **Karney R. Cochran,** Bradley Producing Corp., second vice president of the association, will succeed Hanks as first vice president. **A. C. Simmons,** Bradford, has been elected second vice president. **John W. Bryner,** E. E. Bryner & Co., Bradford, and **John W. Walchli,** Richardson Petroleum Corp., have been elected directors. Walchli had been an ex-officio member of the board. Other officers and directors were reelected.

Bruce D. Brooks, Brazos Oil & Gas Co., has been elected president of the new Sacramento, Calif., Petroleum Association. Other officers are **Basil Holmes,** Shell Oil Co., vice president; **Ron Ackley,** Exploration Logging, secretary-treasurer; and **Don Gladden,** Western Gulf Oil Co., sergeant-at-arms.

William E. Patterson, exploitation engineer with Shell Oil Co. in Roswell, N. M., has been transferred to Abilene, Tex., as reservoir engineer.

grim or forbidding about him. He smiles readily and easily. During his waking hours, except when he's talking, he has a pipe, sometimes going some times not, firmly clenched in his teeth.

He's been an oil man for only 4 years and he is only 42 years old, yet he's the financial vice president of a company with $800,000,000 in assets.

Bradshaw went with Atlantic on June 1, 1956, as assistant general manager of the finance and accounting department. On January 1, 1958, he was made general manager of that department and a vice president. He was elected to Atlantic's board February 1, 1958.

Despite his youth he has been, successively, an associate professor at Harvard Business School, a consultant to U. S. Steel Corp., a special consultant to the Secretary of the Army, a director of the Controllership Foundation and a partner in the management consulting firm of Cresap, McCormick and Paget.

He has authored two books, "Developing Men for Controllership" and "Controllership in Modern Management." And July 1 he takes over as president of the Chamber of Commerce of Greater Philadelphia. He is also a director of the Philadelphia Industrial Development Corp.

His dossier in Atlantic's files records his military service as follows: World War II—United States Navy—Lieutenant j.g. The biography put out by the chamber after his election adds a significant line, "with seven battle stars to his credit."

Bradshaw, as might be expected, is a well educated man. He prepped at Phillips Exeter and graduated in 1940 from Harvard college. Later he earned his masters in business administration and a doctorate in commercial science in Harvard's Graduate School of Business Administration.

The Bradshaws live in Haverford, Pa. They have three children, Nancy Merrill, 16; Priscilla Wells, 15, and Jonathan Grant, 6.

Othel F. Bowden, chief engineer at Anderson-Prichard Oil Corp.'s Cyril, Okla., refinery, has resigned to join W. R. Grace & Co. He will be maintenance department manager, nitrogen products division, at Grace's Memphis plant.

David J. Jones, assistant treasurer of Standard Oil Co. (N. J.), has been appointed manager of a new investment-analysis department. The department will provide a continuing analytical study of capital expenditure and investment programs of Jersey and its affiliates.

M. J. Rathbone, president and chief executive officer of Standard Oil Co. (N.J.), has been elected a director of Morgan Guaranty Trust Co. of New York.

John Myers, geologist in Lafayette, La., for Phillips Petroleum Co., has been transferred to Corpus Christi, Tex., as exploration geologist. **E. C. Fitzgerald,** Lafayette, has been transferred to Bartlesville, Okla., as regional staff geologist.

John Woncik, geologist in Apache Oil Corp.'s Mid-Continent division in Tulsa, has been named division exploration manager. **Mike Johnson,** regional geologist for the Rocky Mountain division, has been appointed division exploration manager in Denver. In other Tulsa changes, **William Goodwin** has been transferred from Denver to Tulsa as division land man. **Peter Verhalen** has been named land man in charge of prior programs. He will be responsible for testing acreage already held by the company. **Jaye Dyer,** Tulsa land man, has been named vice president of Apache Properties, a subsidiary. He will headquarter in Minneapolis and will work primarily with Canadian operations. In Denver, **Vern Lindorff** has joined the company as Rocky Mountain division land man.

Oscar R. Suarez has joined Pan American International Oil Corp. in New York as production engineer. Suarez had been on leave of absence from Pan Am and was with Dowell division of Dow Chemical Co. in Tulsa.

Robert H. Thena, supervising technologist in the technical service division of Mobil International Oil Co.'s Paulsboro, N. J., laboratory, has been appointed chief engineer, fuels, in the product technical service division.

O. L. Smotherman, tool pusher with Falcon Seaboard Drilling Co., has been promoted to Gulf Coast drilling superintendent in Lafayette, La. He succeeds **W. A. Grapes,** who has resigned. Falcon Seaboard has eight rigs active in the area.

G. P. Huston, chief petroleum engineer for Dow Chemical Co.'s Brazos Oil & Gas Co. division, has been named manager of operations. **W. E. Tipton,** geologist in the Houston office, has been named chief geologist. Both are members of the Brazos oil and gas operating committee.

▶▶▶ Personals

MILLER

NUNNALLY

Norman C. Miller, chief geologist for Delhi-Taylor Oil Corp., has been promoted to manager of exploration, a new position. He will supervise all foreign and domestic exploration activities for the company. **J. D. Nunnally,** formerly exploration coordinator, Gulf Coast, for Gulf Oil Corp., will succeed Miller as chief geologist of Delhi-Taylor. Miller has been with Delhi since 1955. He was named chief geologist in 1957.

T. Dean Smith, assistant manager of American Cyanamid Co.'s Avondale, La., petrochemical plant, has been appointed manager of the company's petrochemical department. He will headquarter in New York.

B. L. Ray, vice president and a member of the board of management of Humble Oil & Refining Co.'s Esso Standard division, has retired after 40 years with Esso. Ray was named a director of Esso Standard in 1952. He became general manager of marketing in 1954 and was elected a vice president in 1955.

Charles E. Webber has been named director of Sun Oil Co.'s new natural-gas administration group. The new unit will supervise natural-gas sales and handle FPC certificate applications, gas-rate filings, rate investigations, and related problems. Webber has been technical adviser to the vice president in charge of production. **H. Douglas Coe** has been named assistant director, and **John A. Ward III** has been named attorney for the group.

James F. Vanecek, group leader at the Whiting, Ind., laboratories of Standard Oil Co. (Ind.), has been appointed section leader. He will direct studies on economics of new processes in refining.

G. B. Ryan has been named assistant to **W. K. Bergen,** operations manager in the manufacturing department of Standard Oil Co. (Ohio). Ryan has moved to Cleveland from Houston, where he was in the company's production department.

▶▶▶ Personals

J. J. Hohler, Houston area geologist for Shell Oil Co., has been named New Orleans area exploration manager. **John T. Doyle,** assistant to the vice president of Shell's Pacific Coast area, has been named manager of the gas utilization department in New

HOHLER

DOYLE

York. **R. H. Hurd,** transport manager in Houston, has been transferred to New Orleans in the same capacity. Hohler was Houston division exploration manager for Shell before being named area geologist a few months ago. He joined the company in 1951 as a junior geologist. Doyle was manager of the gas department in Los Angeles before being named assistant to the area vice president in 1958.

Graham W. Fenner, division geophysicist in Ardmore, Okla., for Continental Oil Co., has been promoted to assistant regional geophysicist in the Rocky Mountain region. He will headquarter in Denver.

Spencer J. Schedler, engineer with Humble Oil & Refining Co.'s Carter division, has been transferred to Durango, Colo., from Purcell, Okla.

Fred W. Batten, vice president of Columbia Gas System Service Corp., has been elected vice president and chief operations officer for Columbia Gas System, Inc. He will be responsible for the system's gas production, transmission, and distribution and the extraction of gas liquids. Batten has been with the system since 1936. He has been vice president of Columbia Gas System Service since 1956.

M. J. Markle, manager of operation for Northern Illinois Gas Co., **William E. Preston,** director of planning, and **C. Joseph Gauthier,** assistant manager of operation, have been elected vice presidents. Markle will be in charge of the company's engineering, construction, supply, and storage departments. Preston will be vice president in charge of personnel, long-range planning, and research. Gauthier will be in charge of secretary and treasurer functions, purchasing, stores, real estate, local taxes, claims, and insurance.

George E. Wakefield, assistant division superintendent in Salem, Ill., for Texas Pipe Line Co., has retired after 33 years with the company.

John M. Starke, O. W. Clark, H. M. Erskine, and **H. E. Jackson,** vice presidents of Southern Natural Gas Co., have been elected senior vice presidents, a new position. Starke will continue as general supervisor of the oil and gas and gas-supply division. Clark will continue to supervise operations and engineering. Erskine will continue as financial vice president, and Jackson will continue as treasurer. **C. van den Berg,** vice chairman, will retire July 31 after 33 years with the company. The vice chairman's post will not be filled. Southern Natural also has elected four new vice presidents. They are **William S. Tarver,** who also is general attorney and secretary; **L. N. Brown,** chief engineer; **Robert G. Kenan,** director of industrial relations and insurance; and **Mortimer Jordan,** director of public relations and industrial development. **Howard Maxton** has been elected an assistant treasurer of the company.

John R. Pease, district superintendent with Northern Natural Gas Co., has been transferred to Waterloo, Iowa, from Clark, S. D.

Theodore I. Gradin, assistant director of American Gas Association's bureau of statistics, has been named director of the bureau. He succeeds **Daniel Parson,** who has joined Northern Illinois Gas Co. as manager of rate and economic research.

J. S. Hendrix and **M. D. McClain,** formerly geologists with Texaco Inc., have formed Hendrix & McClain, Inc., geological consulting firm, in New Orleans.

Samuel B. McFarlane, Jr., has been named vice president in charge of research for Sun Chemical Corp.

Donald F. Goodman, project engineer with Pan American Petroleum Corp., has returned to Tulsa after completing a special assignment for the company in Houston.

Sydney Manifold, product specialist with Oronite Chemical Co., has retired after 42 years with Standard Oil Co. of California and its subsidiaries.

Ernest Moncrief, vice president of Fluor Corp.'s Mid-Continent division in Houston, has been appointed vice president and coordinator of foreign operations and affiliates, a new position. **James P. Wiseman,** president of Fluor Products Co., will succeed Moncrief in Houston. Moncrief joined Fluor in 1937. He was assigned to set up the Mid-Continent division in 1948 and became a vice president of the corporation in 1952. He will headquarter in Los Angeles. Wiseman was with Shell Oil Co. before joining Fluor in 1942. He was president of Fluor Corp. of Canada before being named president of Fluor Products in 1955.

N. B. Mavris and **J. C. Phelps** have been promoted to vice presidents of Continental Pipe Line Co. Mavris, manager of administrative services and communications, will be vice president in charge of operations. He succeeds **John L. Kelly,** who recently moved to Fort Worth as assistant general manager of Continental Oil

MAVRIS

PHELPS

Co.'s southwestern region. Phelps, manager of new plans and projects, will be in charge of planning and engineering. Mavris has been assistant chief engineer and assistant to the operations vice president. He also was superintendent of Yellowstone Pipe Line Co., an affiliate, at one time. Phelps was senior engineer before his appointment in 1954 as manager of new plans and projects. Mavris and Phelps will continue to headquarter in Ponca City, Okla.

Ralph Floyd has been named land manager for Shell Oil Co.'s Oklahoma division in Oklahoma City. He had been in Casper, Wyo. Floyd succeeds **John F. Cheadle,** who has been transferred to Shell's area staff in Houston.

C. D. Geiger, district geologist in Vernal, Utah, for Humble Oil & Refining Co., Carter division, has been transferred to Billings, Mont., as northern area production geologist. Geiger has been with Carter since 1947.

Warren R. Shepherd, Union Oil Co. engineer, has been transferred to New Orleans from Houma, La.

Personals

THOMPSON

Albert L. Thompson, engineer in the pipeline department of Monsanto Chemical Co.'s Lion Oil division, has been promoted to crude-oil purchasing and pipeline superintendent for the company. He succeeds **Rodney R. Landes,** who has resigned. Thompson has been with Lion since 1956. The new appointment is effective July 1.

E. V. Harrison, Sunray Mid-Continent Oil Co.'s district geologist in Lafayette, La., has been transferred to Houston as staff geologist. **Guy C. Ellison,** senior geologist, will succeed Harrison.

R. J. (Dick) Boushka, a sales coordinator for Vickers Petroleum Co., Wichita, has been promoted to general sales manager of the chemicals division.

Robert Storch, vice president of Alex W. McCoy Associates, Inc., has been named manager of the Rocky Mountain region. He will move to Denver from Tulsa. Storch was in McCoy's Denver office before being transferred to Tulsa in 1958.

E. E. Clark, Kentucky West Virginia Gas Co., has been elected president of the Kentucky Oil and Gas Association. Other new officers are **John Capito,** United Producing Co., vice president; **George Hoffman,** Henderson, Ky., independent, vice president; **E. A. Owens,** Ashland Oil & Refining Co., vice president; **Angus McDonald,** McDonald, Alford & Roszelle, secretary; and **Robert Reilly,** executive secretary.

R. A. Kurland, senior assistant manager of Phillips Petroleum Co.'s Wichita sales division, has been promoted to division manager. He succeeds **J. D. Phillips,** who has retired after 28 years with the company.

James F. Wygant, section head in engineering research at the Whiting, Ind., laboratories of Standard Oil Co. (Ind.), has been named a fellow of the American Ceramic Society in recognition of his work in applying ceramics, plastics, and insulating materials to uses in petroleum refineries.

Ora C. Collins, Jr., division drilling engineer with Mobil Oil Co. de Venezuela in Anaco, Venezuela, has joined Gulf Coast Drilling & Exploration, Inc., as petroleum engineer in Laurel, Miss.

C. D. Read, economist on special assignment in Gulf Oil Corp.'s planning and economics department, has been appointed manufacturing department manager for Gulf Eastern Co., European subsidiary. Read will be responsible for all manufacturing and product supply matters of Gulf's operations in Western Europe, United Kingdom, and other areas. He will headquarter in London. Read was chief engineer of British-American Oil Co. and a vice president of Wood River Oil & Refining Co., Inc., before joining Gulf in 1956.

Jess Knowles, vice president in charge of marketing for Skelly Oil Co., has retired after 16 years in this post. Knowles has been with Skelly since 1928.

James G. Wilkins, superintendent of El Paso Natural Gas Co.'s Salt Lake City exploration division, has resigned to open consulting offices in Salt Lake City.

Deaths

Claud W. (Doc) Burger, 63, division safety director for Pure Oil Co. in Sapulpa, Okla., died June 3 at his home in Sapulpa after a heart attack. Burger had been with the company 42 years.

B. Harrison Mays, 52, owner of Mays Oil Co. and Mays, Inc., Cushing, Okla., died June 3 in the crash of his private plane near Table Rock, Mo.

S. J. Ryan, 64, Houston independent operator, died June 5 at his home after a heart attack. Ryan was with Humble Oil & Refining Co. before becoming an independent.

Frank E. Stickle, 70, chairman of Stickle Drilling Co., Tulsa, died June 6 in a Tulsa hospital. Stickle organized Stickle Drilling in 1945. He was with John Mabee interests before setting up his own operations.

Matthew Joseph Kirwan, retired production manager of Cities Service Oil Co., died June 4 in a Dallas hospital. Kirwan was with Nippon Oil Co. in Japan as chief petroleum engineer before joining Cities Service. He retired in 1952 after 28 years with the company.

George Jean Lakis, 41, engineer with Fluor Corp. in Houston, died June 1 in McCamey, Tex.

H. J. Bemis, 70, retired manager of the gasoline and refined-oils department of Standard Oil Co. (Ind.), died May 31. Bemis retired in 1954 after 43 years with Indiana Standard.

W. H. Wortham, 73, San Antonio, Tex., independent operator, died June 1 in San Antonio. Wortham was with Sinclair Oil & Gas Co. before becoming an independent. He moved to San Antonio from Houston in 1950.

Frank B. Champion, 60, owner and president of Champion Oil & Gas Co., Houston, died June 3 in a Houston hospital. Champion was manager of the Glenn McCarthy interests in Houston before forming his own company in 1948.

Hiram A. King, 79, retired vice president of Sinclair Oil & Refining Co., died June 2 in Houston. King joined Sinclair in 1916. He was named a vice president in 1922. He retired 12 years ago.

John Heywood Dalton, 65, retired manager of Anderson-Prichard Oil Corp.'s land and lease department, died June 4 at his home in Oklahoma City. Dalton retired last year after 25 years with the company.

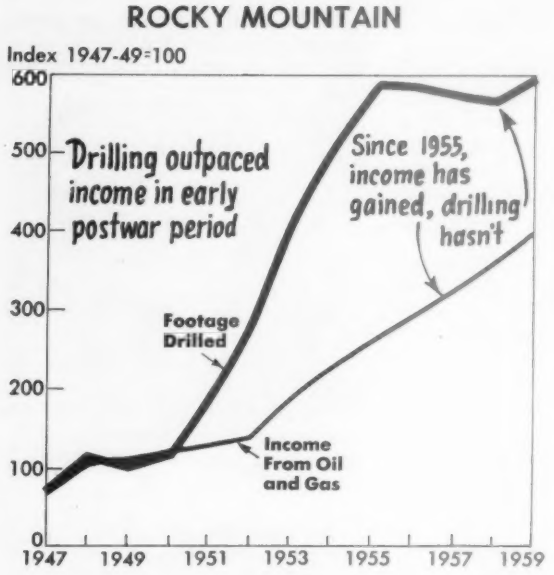
Fredrick M. Carroll, 53, retired Shell Oil Co. mechanical engineer, died June 6 at his home in Tulsa after a heart attack. Carroll retired last year after 23 years with the company.

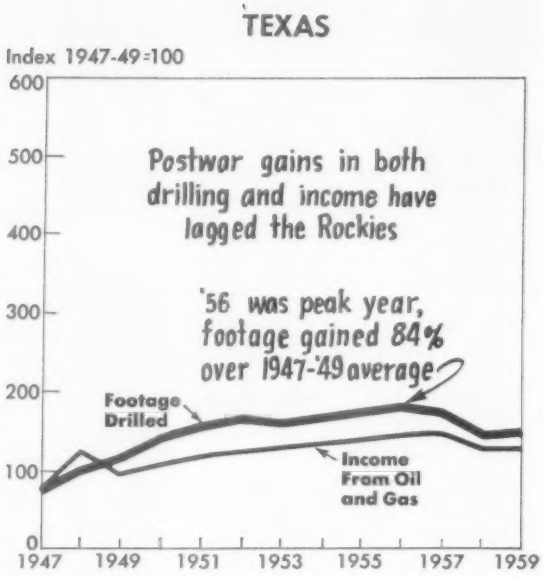
C. O. Hoover, 55, district manager for Socony Mobil Oil Co., Inc., in Springfield, Ill., died June 4 at his home in Springfield.

J. W. (Pete) Gillespie, former district credit manager for National Supply Co. in Casper, Wyo., died May 30 in Billings, Mont., after a long illness.

Floyd W. Gibson, 65, retired Tulsa independent operator, died June 6.

George L. Struble, 85, retired Tulsa independent operator, died June 8 in a Tulsa nursing home.





Drilling plans shift faster in new areas

BY JOHN C. CASPER

FOOTAGE DRILLED in the search for oil and gas increased more than income from oil and gas sales in the period just after World War II.

There were two important reasons for this trend. Government regulations limited drilling during the war. And, there was a heavy flow of capital into the oil industry in the early fifties.

The charts above show the effect of these trends on new and old producing areas in this country. Comparisons are between Texas and the Rocky Mountain district.

Note that footage has increased faster than income for both areas, but the rate of gain has been much larger for Rocky Mountain fields.

Percentage gains in Texas income were almost as large as those for the Rocky Mountain region through the year 1952. There is little basis for comparison after that date.

The big drilling boom for the Rocky Mountain district started about 2 years ahead of the first big gain in income. Early increases in revenue can be credited to expansion in pipeline capacity to the high-demand areas of District 2. Platte Pipeline was completed in 1952 and Arapahoe in 1954 Service Pipeline also added capacity.

This big gain in movement to the east was followed by development of both crude and gas production in the Four Corners area. These changes, plus lack of state limitation on production, account for the rapid rise in Rocky Mountain income from oil and gas.

But, the gain in income was overshadowed by drilling activity. The first sharp upturn in well completions was in 1951. Drilled footage jumped 45% that year. The expansion period lasted 5 years, reaching a peak of 23,895,000 ft. of hole in 1955. Drilling has tended to level off since that time.

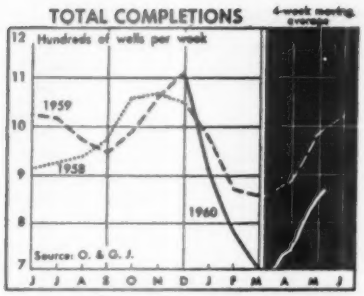
The big spread between income and footage on the chart indicates a movement of producing capital into the Rocky Mountain area in the 1950-55 period. This flow of capital has slowed down in recent years but operators still are drilling more feet of hole per million dollars income than they did in the early postwar period.

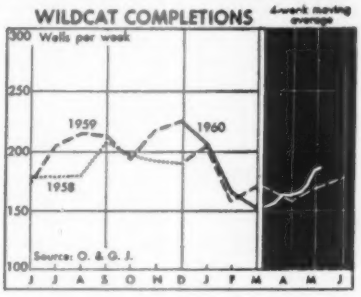
Relative gains in Texas income and drilling are shown on the second chart. The peak year for Texas was in 1956 when operators cut 92,620,000 ft. of hole.

Percentage gains in Texas drilling have been small compared with the Rocky Mountains, but actual increases have been large. Total Texas footage for 1959 showed a gain of 27,730,000 ft. over the average for 1947-49. This gain represented an annual increase of 4.1%. If all of the increased footage in the Rocky Mountains had been added to Texas drilling, the average annual increase for that state would have been raised to 5.2%.

A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,810,405	DOWN	7,145	DOWN	308,365
Crude stocks	259,655,000	DOWN	858,000	DOWN	2,865,000
Completions	875	UP	36	DOWN	103
Refinery runs	7,961,000	UP	62,000	DOWN	243,000
Gasoline stocks	209,908,000	DOWN	1,745,000	UP	6,303,000
Kerosine stocks	25,017,000	UP	596,000	DOWN	46,000
Distillate stocks	96,341,000	UP	4,888,000	DOWN	6,155,000
Residual stocks	39,733,000	DOWN	264,000	DOWN	15,882,000
Four-product stocks	370,999,000	UP	3,475,000	DOWN	15,780,000
Total imports	1,637,400	UP	64,300	UP	253,700





Active Rotary Rigs

	6-6-60	5-30-60	6-8-59
Alabama	3	2	7
Alaska	4	5	(†)
Arkansas	14	11	14
Arizona	1	1	3
California	84	92	104
Land	79	88	99
Offshore	5	4	5
Colorado	32	29	49
Florida	2	1	3
Land	2	1	2
Offshore	0	0	1
Illinois	42	43	41
Indiana	7	9	11
Iowa	0	0	3
Kansas	121	128	140
Kentucky	5	5	8
Louisiana	291	285	380
North	41	36	33
S. Inland waters	117	109	157
S. Land	79	85	127
Offshore	54	55	63
Maryland	0	0	0
Michigan	40	39	25
Mississippi	59	52	67
Missouri	3	3	1
Montana	22	21	24
Nebraska	25	27	27
Nevada	0	0	1
New Mexico	127	121	137
New York	0	1	1
North Dakota	18	16	35
Ohio	6	6	2
Oklahoma	187	176	243
Oregon	1	1	0
Pennsylvania	14	11	9
South Dakota	1	1	2
Texas	638	626	779
S. Inland waters	6	6	5
S. Land	182	172	195
Offshore	2	1	1
North	48	48	161
Panhandle	48	48	(*)
East	60	54	(*)
West Central	176	190	255
West	116	107	162
Utah	31	32	30
Washington	0	0	1
West Virginia	4	4	8
Wyoming	65	59	90
Total U. S.	1,847	1,807	2,245
Western Canada	133	123	149
Eastern Canada	2	2	0
Grand Total	1,982	1,932	2,394

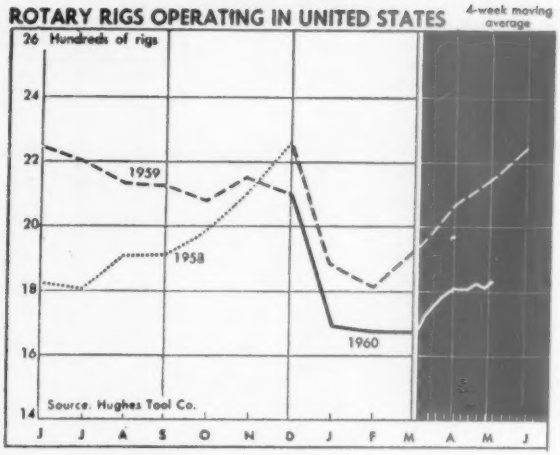
Hughes Tool Co. report. *Included in North. Comparisons not available due to change in method of reporting. †Data first reported 4-4-60.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED JUNE 4, 1960

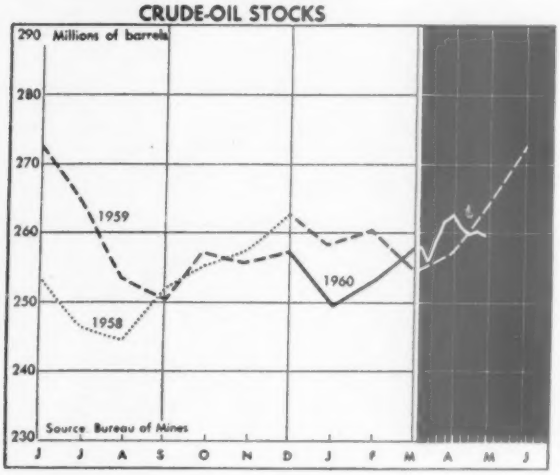
	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1960	1959	Total	Crude	Cond.	Gas	Dry	1960	1959
Alabama	0	0	0	0	0	0	0	22	43	0	0	0	0	0	1	7
Arizona	0	0	0	0	0	0	0	7	.....	0	0	0	0	0	7	.....
Arkansas	14	4	0	1	9	0	49,531	259	350	5	2	0	1	2	65	58
California	26	15	0	2	9	0	102,706	569	653	5	0	0	0	5	126	155
Colorado	9	2	0	1	6	0	44,736	273	306	4	0	0	0	4	130	180
Illinois	51	17	0	0	26	8	100,345	831	895	5	0	0	0	5	197	150
Indiana	26	8	0	0	18	0	38,330	391	309	8	2	0	0	6	154	103
Kansas	71	41	0	1	27	2	248,387	1,379	1,727	22	9	0	0	13	459	383
Kentucky	31	9	0	2	20	0	47,008	685	874	4	1	0	0	3	81	68
Louisiana	71	33	6	5	27	0	532,568	1,422	1,516	13	1	1	0	11	209	189
North	28	11	0	4	13	0	100,993	464	539	5	0	0	0	5	88	79
South	31	15	5	1	10	0	312,654	723	812	6	1	1	0	4	106	104
Offshore	12	7	1	0	4	0	118,921	235	165	2	0	0	0	2	15	6
Michigan	14	9	0	0	5	0	50,675	309	246	3	1	0	0	2	94	56
Mississippi	15	4	0	0	11	0	156,300	314	268	10	1	0	0	9	105	122
Montana	5	2	0	0	3	0	25,128	108	120	2	0	0	0	2	49	42
Nebraska	14	5	0	0	9	0	81,767	341	336	4	0	0	0	4	128	153
New Mexico	36	22	1	6	7	0	181,524	769	789	4	0	0	0	4	111	87
West	9	2	0	6	1	0	47,271	248	351	0	0	0	0	0	22	26
East	27	20	1	0	6	0	134,253	521	438	4	0	0	0	4	89	61
New York	22	13	0	0	2	7	29,700	144	143	0	0	0	0	0	7	13
North Dakota	3	0	0	0	3	0	13,565	130	210	3	0	0	0	3	29	44
Ohio	11	8	0	3	0	0	31,374	439	407	0	0	0	0	0	24	9
Oklahoma	75	46	2	6	18	3	341,609	1,653	2,511	13	3	0	2	8	316	385
Pennsylvania	0	0	0	0	0	0	0	246	212	0	0	0	0	0	7	3
South Dakota	0	0	0	0	0	0	0	15	.....	0	0	0	0	0	6	.....
Texas	344	180	21	16	120	7	1,487,698	6,854	8,203	63	1	3	4	55	1,377	1,525
Dist. 1	14	4	0	0	10	0	33,962	467	489	9	0	0	0	9	164	135
Dist. 2	18	6	4	3	5	0	117,299	326	348	3	0	0	0	3	76	95
Dist. 3	28	10	2	2	14	0	187,315	530	491	4	0	0	0	4	98	108
Dist. 4	13	5	1	2	5	0	73,613	485	547	6	0	1	2	3	139	140
East	27	8	3	0	14	2	138,626	521	474	6	0	0	0	6	111	97
Dist. 7-B	47	19	0	3	25	0	132,825	995	1,144	15	0	0	2	13	241	305
West	103	80	5	0	16	2	537,894	1,820	2,566	7	0	2	0	5	292	314
Dist. 9	73	38	2	0	31	2	178,869	1,286	1,555	13	1	0	0	12	188	280
Dist. 10	21	10	4	6	0	1	87,295	424	589	0	0	0	0	0	28	51
Utah	7	2	0	4	1	0	37,183	124	153	2	0	0	1	1	44	42
West Virginia	10	1	0	7	2	0	25,207	322	310	0	0	0	0	0	4	9
Wyoming	20	7	0	1	12	0	102,397	414	348	12	1	0	0	11	178	110
Miscellaneous	0	0	0	0	0	0	0	41	31	0	0	0	0	0	39	22
Total U. S.	875	428	30	55	335	27	3,726,738	18,061	20,960	182	22	4	8	148	3,947	3,915
Prev. week	839	399	21	66	329	24	3,665,355	.....	.....	211	17	2	10	182	.....	.....
Cum. 1960	18,061	8,524	574	1,465	6,978	520	79,178,545	.....	.....	3,947	364	45	134	3,404	.....	.....
Cum. 1959	20,960	10,685	524	1,516	7,677	558	87,341,148	.....	.....	3,915	397	56	118	3,344	.....	.....
Western Canada	43	8	0	0	5	0	224,017	915	1,024	7	1	0	3	0	268	350

PRODUCTION

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	5-28-60	5-21-60	5-30-59
Pennsylvania	2,145	2,178	2,476
Other Appalachian	1,827	1,675	1,706
Illinois, Indiana, Michigan	9,946	9,643	9,108
Nebraska and North Dakota	2,791	2,686	2,537
Kansas	9,817	10,224	10,324
Oklahoma	17,583	17,836	17,162
Arkansas	1,967	1,943	1,838
Louisiana	19,920	19,265	18,984
North	3,471	3,398	3,203
South	16,449	15,867	15,781
Mississippi, Alabama, Florida	2,050	2,243	2,373
New Mexico	7,799	7,657	8,046
Texas	110,211	111,606	115,187
East Texas	8,967	9,033	9,579
West Texas	49,717	50,854	55,063
Texas Gulf	19,344	19,301	18,692
Other Texas	32,183	32,418	31,853
Wyoming	17,718	18,122	16,523
Other Rocky Mountain	10,382	9,701	9,176
California	29,016	28,702	32,235
Foreign	† 16,483	17,032	14,845
Total	**259,655**	260,513	262,520

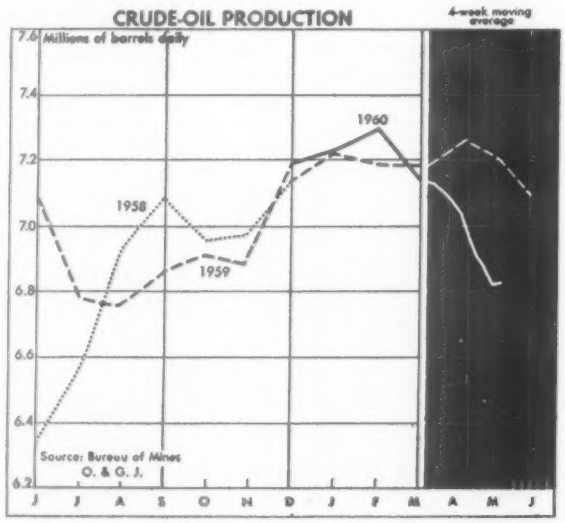
*Bureau of Mines. †Includes 4,383,000 bbl. in California.

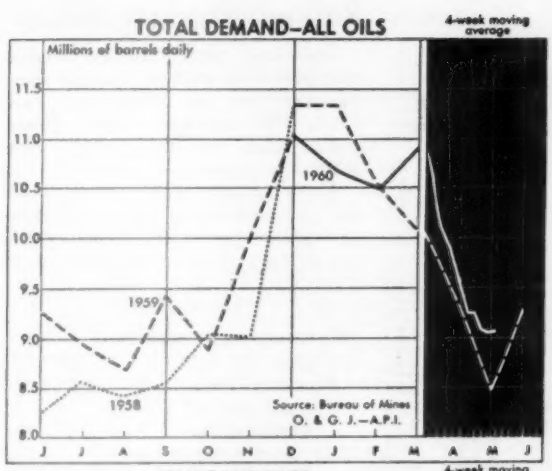
DAILY AVERAGE PRODUCTION FOR WEEK

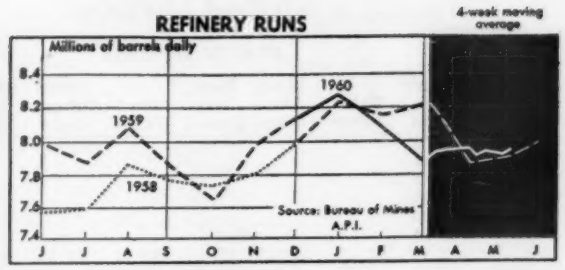
	June 4, 1960			May 28
	Crude oil	Lease condensate	Total	total
Alabama	17,900	.....	17,900	17,825
Arkansas	77,050	100	77,150	77,125
California	830,700	.....	830,700	828,200
Colorado	130,700	.....	130,700	130,000
Eastern	40,200	.....	40,200	39,800
Florida	1,000	.....	1,000	1,000
Illinois	211,500	.....	211,500	210,700
Indiana	31,700	.....	31,700	31,800
Kansas	†288,580	.....	†288,580	†308,650
Kentucky	63,500	.....	63,500	62,800
Louisiana	924,025	126,650	1,050,675	1,051,700
North	107,025	6,150	113,175	113,200
South	817,000	120,500	937,500	938,500
Michigan	32,900	.....	32,900	32,900
Mississippi	132,450	3,850	136,300	140,600
Montana	76,100	.....	76,100	77,000
Nebraska	60,100	.....	60,100	60,700
Nevada	100	.....	100	100
New Mexico	282,000	6,500	288,500	300,000
North Dakota	60,400	.....	60,400	60,700
Oklahoma	†501,800	.....	†501,800	†509,600
Texas	2,374,000	87,900	2,461,900	2,415,900
Dist. 1	42,000	3,000	45,000	43,000
Dist. 2	100,000	8,200	108,200	106,000
Dist. 3	314,000	37,000	351,000	345,000
Dist. 4	163,000	18,000	181,000	177,000
Dist. 5	26,000	350	26,350	26,400
Dist. 6	102,000	9,000	111,000	107,800
East Texas field	123,000	.....	123,000	120,000
Dist. 7-B	126,000	150	126,150	121,175
Dist. 7-C	117,000	2,825	119,825	116,825
Dist. 8	958,000	6,500	964,500	950,000
Dist. 9	196,000	1,900	197,900	194,700
Dist. 10	107,000	975	107,975	108,000
Utah	105,000	.....	105,000	119,400
Wyoming	342,500	.....	342,500	340,000
Others	‡1,200	.....	‡1,200	‡1,050
Total U. S.	6,595,405	225,500	**6,810,405**	6,817,550
Change from prev. week, down		.....	**7,145**	.....
Canada	†549,000	.....	†549,500	†586,400
Total U. S. Prod.-Jan. 1-June 4				1,105,389,800 bbl.
Same period last year (crude plus cond.)				*1,118,166,100 bbl.

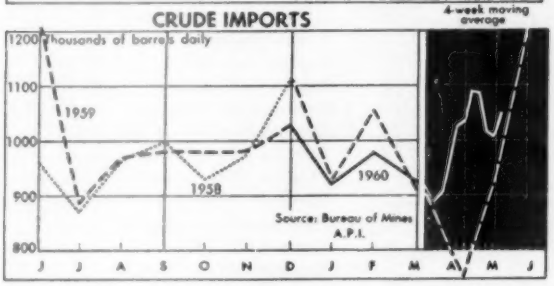
Includes 29,781,000 bbl. condensate. †Week ended previous Monday. ‡Alaska and South Dakota.

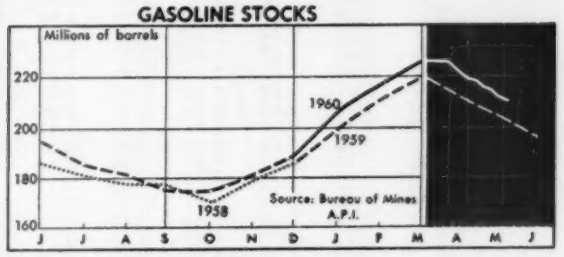
CRUDE-OIL PRODUCTION

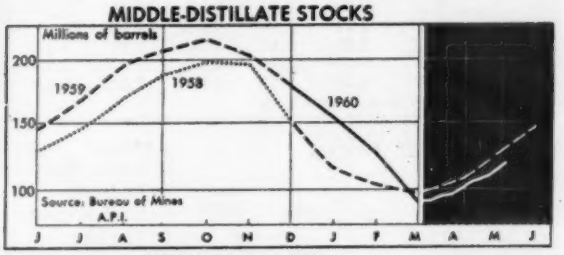


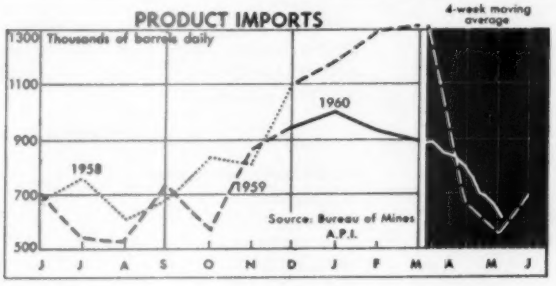


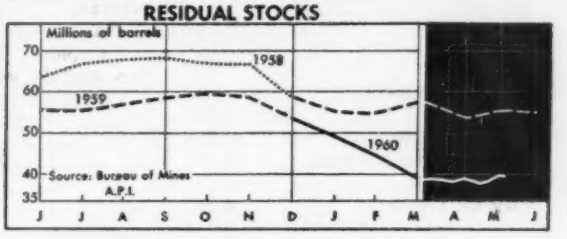












API REFINERY REPORT—JUNE 3, 1960

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, June 1959 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,164	517.6	25.4	367.3	179.0	47,568	9,471	33,076	11,395	1,067	490.5	19.6	281.2	171.5
Appalachian:														
District 1	97	39.1	4.0	21.9	9.9	6,487	579	2,153	387	104	45.3	3.2	22.6	6.8
District 2	72	41.0	1.6	14.3	3.7	2,935	261	993	330	110	52.0	5.1	22.9	8.2
Ind., Ill., Ky.	1,431	791.9	69.4	279.4	153.9	38,485	4,838	16,445	4,525	1,497	777.9	62.7	302.4	147.9
Minn., Wis., Dak.	128	63.7	0.6	31.7	17.3	6,572	806	3,810	659	114	53.4	5.7	29.2	14.3
Okla., Kans., Mo.	731	400.9	18.3	161.0	18.7	19,784	1,175	8,191	981	759	417.3	12.8	179.0	23.7
Inland Texas	295	204.9	9.7	50.7	16.1	6,996	568	1,624	2,432	292	226.0	8.5	51.6	19.5
Tex. Gulf Coast	1,873	954.4	109.1	426.0	142.6	24,269	3,031	10,014	4,071	1,788	965.4	72.5	449.4	149.5
La. Gulf Coast	668	350.9	45.9	144.9	51.4	11,584	1,505	3,686	1,279	720	396.6	41.1	190.0	50.3
N. La. and Ark.	106	60.0	6.0	19.7	5.0	5,871	733	2,344	121	94	44.4	5.0	21.3	6.5
Rocky Mtn.:														
New Mexico	24	13.1	0.4	4.4	2.1	870	44	176	55	24	12.3	0.1	4.6	2.6
Other	259	130.1	2.1	61.4	27.4	6,696	233	2,212	990	304	131.3	3.7	62.8	29.4
West Coast	1,113	567.1	32.6	166.6	262.8	31,791	1,773	11,617	12,508	1,117	516.9	3.8	174.6	284.7
June 3, 1960	7,961	4,134.7	325.1	1,749.3	889.9	209,908	25,017	96,341	39,733	7,990	4,129.3	243.8	1,791.6	914.9
May 27, 1960	7,899	4,093.4	332.0	1,757.9	900.6	211,653	24,421	91,453	39,997	.....	.....	.....	.....	.....
June 5, 1959	8,204	4,164.6	279.4	1,811.9	1,020.1	203,605	25,063	102,496	55,615	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil Prices

GRAVITY SCHEDULE

	Signal Hill, Calif.	Okla-homa	West Tex. (sour)	West Tex. (Inter.)	No.* Texas	Texas Refugio Light	Bayou Sale (La.)	Denver Jules-burg	Wyo. (sour)
14-14.9	$1.76	....	....	....	....	....	....	....	....
15-15.9	1.84	....	....	....	....	....	....	....	$1.81
16-16.9	1.92	....	....	....	....	....	....	....	1.86
17-17.9	2.00	....	....	....	....	....	....	....	1.91
18-18.9	2.08	....	....	....	....	....	....	....	1.96
19-19.9	2.16	....	....	....	....	....	....	....	2.01
20-20.9	2.24	$2.49	$2.35	$2.61	$2.29	$2.95	$2.90	$2.58	2.06
21-21.9	2.32	2.52	2.38	2.63	2.33	2.97	2.92	2.60	2.11
22-22.9	2.39	2.55	2.41	2.65	2.37	2.99	2.94	2.62	2.16
23-23.9	2.46	2.58	2.44	2.67	2.41	3.01	2.96	2.64	2.21
24-24.9	2.53	2.61	2.47	2.69	2.45	3.03	2.98	2.66	2.26
25-25.9	2.60	2.64	2.50	2.71	2.49	3.05	3.00	2.68	2.31
26-26.9	2.67	2.67	2.53	2.73	2.53	3.07	3.02	2.70	2.36
27-27.9	2.74	2.70	2.56	2.75	2.57	3.09	3.04	2.72	2.49
28-28.9	2.81	2.73	2.59	2.77	2.61	3.11	3.06	2.74	2.54
29-29.9	2.87	2.76	2.62	2.79	2.65	3.13	3.08	2.76	2.59
30-30.9	2.93	2.79	2.65	2.81	2.69	3.15	3.10	2.78	2.63
31-31.9	3.00	2.82	2.68	2.83	2.73	3.17	3.12	2.80	2.67
32-32.9	3.06	2.85	2.71	2.85	2.77	3.19	3.14	2.82	2.71
33-33.9	3.12	2.88	2.74	2.87	2.81	3.21	3.16	2.84	2.75
34-34.9	3.17	2.91	2.77	2.89	2.85	3.23	3.18	2.86	2.79
35-35.9	3.22	2.94	2.80	2.91	2.89	3.25	3.20	2.88	2.83
36-36.9	3.27	2.97	2.83	2.93	2.93	3.27	3.22	2.90	2.87
37-37.9	3.31	2.99	2.86	2.95	2.95	3.29	3.24	2.92	2.89
38-38.9	....	3.01	2.89	2.97	2.97	3.31	3.26	2.94	2.91
39-39.9	....	3.03	2.92	2.99	2.99	3.33	3.28	2.96	2.93
40-44.9	....	3.05	2.95	3.01	3.01	3.35	3.30	2.98	2.95

*Cooke, Grayson, Montague.

Flat Prices

Louisiana:
- Sweet Lake $3.00

Texas:
- East Texas 3.05-3.25
- Conroe 3.23-3.53
- Van 3.08

Pennsylvania Grade:
- Bradford $4.70
- Middle District 4.52
- Southwest Pennsylvania ... 4.25
- West Virginia 4.07
- Buckeye Grade 4.07

Illinois Basin **3.00**

Foreign

Middle East, Persian Gulf (cargoes f.o.b. lifting port):
- Arabian, about 34°, Ras Tanura $1.90
- Iranian, 34.0°-34.9°, Bandar Masur 1.86
- Iranian, 34.0°-34.9°, Abadan 1.81
- Iraq, 36.0°-36.9°, Fao 1.82
- Kuwait, 31.0-31.9°, Mina-al-Ahmadi 1.67
- Qatar, about 41°, Um Said . 2.05

Middle East, E. Mediterranean:
- Arabian, about 35°, Sidon .. 2.29
- Iraq, about 35°, Tripoli, Banias 2.29

Far East (cargoes, f.o.b. Lutong, Sarawak):
- Seria Light, 37° 2.57

Canada:
- Leduc-Woodbend $2.53
- Redwater (Alta.) 2.42
- Smiley (Sask.) 2.18
- Pembina 2.38

Venezuela:
- Cumarebo, 47°-47.9°, Tucupido 3.34
- San Joaquin, 40°-40.9°, Puerto La Cruz 3.08
- Oficina, 35°-35.9°, Puerto La Cruz 2.80
- Tia Juana medium, 26°-26.9°, Amuay* 2.30
- Quiriquire, 16.0°-16.4°, Caripito 2.10
- Lagunillas heavy, flat, Las Piedras* 2.10
- Bachaquero, flat, 15°-16°, Las Piedras* 1.88

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Tanker Rates (Long Ton)

(Latest reported spot fixtures)

- ★ Gulf-NY, clean (ATRS −22.5%) $2.21
- ★ Gulf-NY, dirty (ATRS −27.5%) 2.07
- ★ Carib.-NY, dirty (ATRS −65.0%) 0.96
- PG-UK, dirty (Scale −67.5%) (21s. 10d.) 3.05

★ Denotes change from previous week.

Refined-Product Prices

Following quotations are realistic spot prices for refined products moving interstate on Wednesday each week. They may differ from refiners' posted prices and should not be considered as postings.

Light-product prices are in cents per gallon. Residual and crude prices are dollars per barrel. Crude prices are at the well unless otherwise listed.

Gasoline*

Mid-Continent (Group 3):
- ★ Regular (91 octane) .. 11.00-11.25
- ★ Premium (99 octane) . 13.75-14.00
- Natural gasoline (26-70) 4.5
- Breckenridge 4.0

Gulf Coast (cargoes for coastwise or export movements):
- Regular (90 octane) .. 10.25-10.50
- Regular (92 octane) .. 10.50-10.75
- ★ Premium (98 octane).. 11.50-11.75

California (rack) Los Angeles):
- Regular (88 octane) .. 11.65-12.15
- Premium (94 octane) 12.65-13.15
- Premium (100 octane) 14.00-14.65

Caribbean area (cargoes):
- Regular (87 octane) .. 10.00
- Premium (97 octane) 11.625

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

Kerosine and Distillate

Mid-Continent (Group 3):
- ★ Kerosine 42-44 ..... 9.00-9.25
- ★ Diesel oil (58 d.i. and above) 8.75-9.00
- ★ Distillate No. 1 ..... 8.75-9.00
- ★ Distillate No. 2 ..... 7.75-8.00

Gulf Coast (cargoes):
- ★ Kerosine 41-43 ..... 9.00
- ★ Distillate No. 2 ..... 8.00

New York Harbor (barges):
- Kerosine 41-43 ..... 9.8-10.3
- Distillate No. 2 ..... 8.8- 9.3
- Diesel fuel, 48-52 d.i. .. 9.1- 9.6

Caribbean area (cargoes):
- Distillate No. 2 ..... 8.00

Residual Fuel (Bbl.)

Mid-Continent (Group 3):
- Residual fuel (max. 1% S) $1.70-1.80

Gulf Coast (cargoes):
- Bunker C fuel 2.10-2.25

New York Harbor (barges):
- Bunker C fuel $2.47

Caribbean (cargoes):
- Bunker C $2.10

California (rack):
- Bunker C fuel, Los Angeles $2.15

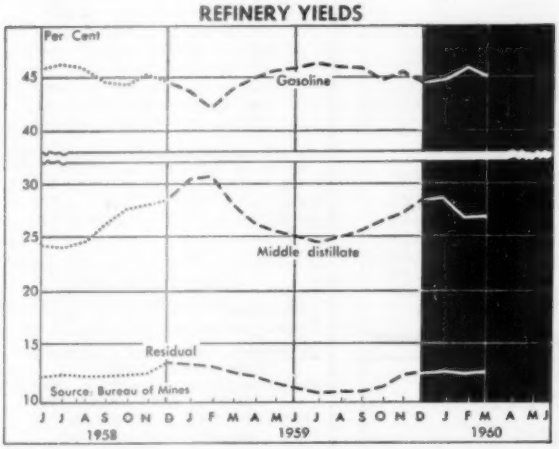
★ Denotes change from previous week.

SUPPLY AND DEMAND—MAJOR PRODUCTS
(Thousands of barrels daily)

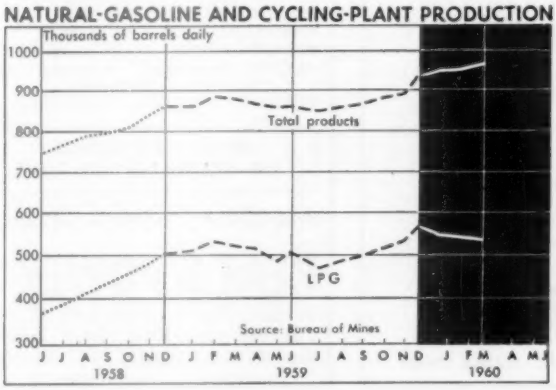
	Total demand	Refinery production	Stocks end of period†
GASOLINE			
May 1960*	4,350	3,990	210,400
April 1960*	4,310	4,030	219,000
March 1960	3,928	4,038	222,691
June 1959	4,371	4,129	196,078
May 1959	4,193	3,961	201,710
KEROSINE			
May 1960*	185	325	24,900
April 1960*	245	338	20,400
March 1960	517	366	18,440
June 1959	149	244	27,364
May 1959	132	245	24,535
DISTILLATE			
May 1960*	1,330	1,720	94,900
April 1960*	1,595	1,770	82,000
March 1960	2,843	1,797	73,948
June 1959	1,214	1,792	120,962
May 1959	1,279	1,752	101,816
RESIDUAL			
May 1960*	1,400	1,070	39,800
April 1960*	1,600	945	39,000
March 1960	2,015	1,002	40,503
June 1959	1,385	915	55,479
May 1959	1,342	899	53,961

*Preliminary. †Thousands of barrels.

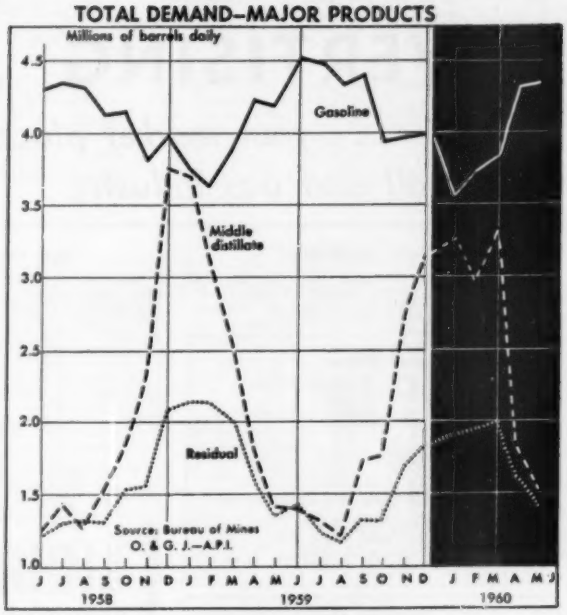
REFINERY YIELDS



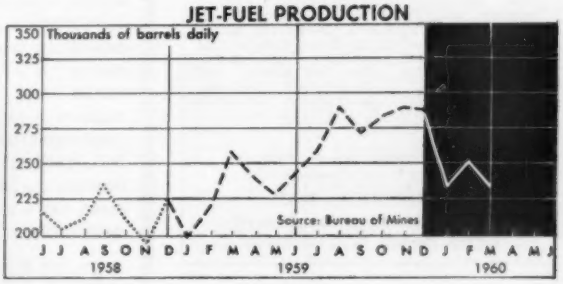
NATURAL-GASOLINE AND CYCLING-PLANT PRODUCTION



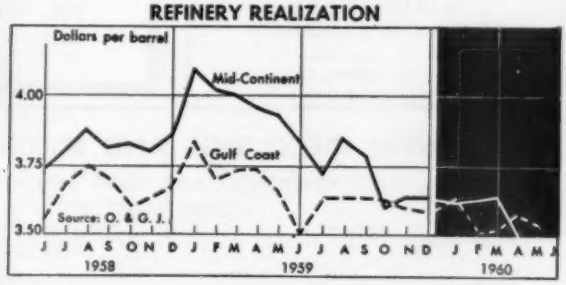
TOTAL DEMAND–MAJOR PRODUCTS



JET-FUEL PRODUCTION



REFINERY REALIZATION



REFINERY REALIZATION

	May*	April*	Mar.	Feb.
Mid-Continent	$3.44	$3.50	$3.60	$3.59
Gulf Coast	3.54	3.60	3.59	3.62

*Preliminary. Refinery realization is based on yields of major products and average spot prices of regular gasoline, kerosine, No. 2 fuel, and residual as published in The Oil and Gas Journal.

CLASSIFIED ADVERTISING

. . . your market place for the oil and gas industry

RATES:
UNDISPLAYED CLASSIFIED 25c a word per issue. 10% discount three or more consecutive issues. $5.00 minimum charge. Blind Box in our care nine words. Payable in advance.

DISPLAY CLASSIFIED
$19.00 a column inch one issue . . . 10% Discount three or more consecutive issues.

Address Classified Advertising Material: The Oil and Gas Journal P. O. Box 1260, Tulsa 1, Okla.

EXCEPT . . .

WESTERN STATES: (California, Washington, Oregon, Idaho, Nevada, Utah, and Arizona) Write: Classified Departments, Inc., The Oil and Gas Journal, 4041 Marlton Ave., Los Angeles 8, Calif. Phone AXminister 2-0257.

FOR SALE EQUIPMENT

NO. 45 STAR Spudder on rubber. 145 H. P. Hercules motor (good) Tools 15 in. down, ready to drill. Inventory on request. Elk Drilling Co. Inc., Howard, Kans.

—PIPE—

2,000,000 ft.	2"	3.50# to the ft.
1,000,000 ft.	3"	7.70#
1,000,000 ft.	4"	10.98#
500,000 ft.	6"	19.80#
200,000 ft.	8 5/8"	28#
400,000 ft.	10¾"	35#
75,000 ft.	12¾"	40#
10,000 ft.	16"	42#

All No. I Grade plain end and cleaned.

INDIANA-OHIO PIPE CO.
P. O. Box 5412 Shep. Sta.
Columbus 19, Ohio
Phone CL 3-5527

5—VT-12-I CUMMINS DIESEL ENGINES

Used less than 250 hours. 600 H.P. @2100 RPM. Equipped with #O-SAE flywheel housing; 2—#T-500 turbocharges; 2—15" oil bath air cleaners; 2—Perry water filters; Penn. safety controls, mechanical variable 3-speed governor. Includes industrial radiator with fan drive, and with or without Cotta 6-speed transmission. Price with transmission $11,000.00 each, FOB Long Beach, California or Breckenridge, Texas.

For information call or write:

W. E. RAFFETY
BJ SERVICE, INC.
6505 Paramount Boulevard
Long Beach 5, California

BAILEY BRIDGES

Portable Prefabricated
BAILEY BRIDGE
RENTALS & EQUIPMENT
P. O. Box 753,
San Luis Obispo, Calif.

FOR SALE EQUIPMENT

1952 16-ton Mack on gasoline, new motor and transmission, good rubber, clean body. factory built, steel oil field bed with head ache rack gin poles, two Tulsa winches—$5,200.00. Phone—Fleetwood 61635, P. O. Box 8073, Amarillo, Texas.

MAYHEW MODEL 2000 on I.H.C. Tandem. 48' mast. 5 x 8 pump and booster, 2—⅞ x 20 drill pipe. Extra truck and trailer, Complete—now drilling. Write for Inventory. Box L-878, The Oil and Gas Journal, Tulsa, Oklahoma.

18" AND 20" good used pipe. Very attractive prices. Contact: The Tri-State Pipe Co., Bellaire, Ohio. Telephone OR 6-1452.

LIQUIDATION

AMOCO REF. DESTREHAN, LA.

BOILERS, 70,000 #/hr. & 80,000 #/hr. 450 Psi.
HORTONSPHERES, 5,000 & 10,000 bbl.
EXCHANGERS, 70 to 2,800 sq. ft.
TOWERS, 3 ft. to 7½ ft. diameter.
VESSELS, 2 ft. to 10 ft. diameter.
FURNACES, 26 MM BTU/hr.
TURBO EXHAUSTERS, 15,360 & 17,000 CFM.
CENT. PUMPS, 15 to 7,000 GPM.
TURBINES, 5 to 290 HP.
TANKS, 1,000 to 29,000 bbl.
COMPRESSORS, (IR) XVG—4 & XVG—2.

BRILL EQUIPMENT COMPANY
DESTREHAN, LA.
TEL. NORCO 6571
35-53 JABEZ ST. NEWARK, N. J.
4101 SAN JACINTO, HOUSTON, TEXAS

FOR SALE EQUIPMENT

3-CLARK GAS COMPRESSORS
500 H. P., Model RA-5
14" x 14", 300 RPM With
17" x 14" VTH Cylinders
COMPLETE-EXCELLENT CONDITION
HEAT & POWER CO., INC.
60 E. 42nd St., N. Y. 17, N. Y.
310 Thompson Bldg., Tulsa 3, Okla.

LIQUIDATION

at ESSO REFINERY Balto., Md.

10,000 BBL/DAY FLUID COKER
COMPLETE—NEW 1955
STILL ON FOUNDATIONS

TOWERS

10'	x 145'—125 PSI 50 trays
9'6"	x 121'—325 PSI 30 trays
8'6"	x 103'—165 PSI 24 trays
7'0"	x 82'— 75 PSI 30 trays
6'0"	x 80'—300 PSI 30 trays
4'0"	x 44'—150 PSI 12 trays
3'6"	x 38'—400 PSI 12 trays
2'6"	x 52'—360 PSI 22 trays
2'2"	x 57'— 85 PSI 4 trays

HEAT EXCHANGERS—CONDENSERS

Steel Tube	7,500 to 100 sq. ft.
Adm. Tube	3,500 to 220 sq. ft.
Cu Ni Tube	2,330 to 300 sq. ft.
S. S. Tube	1,000 to 170 sq. ft.

CLARK COMPRESSORS
RA5 GAS ENGINE 2VTH 17" x 14" CYL

BLOWERS—28,000 CFM @ 17 PSIG
11,800 CFM @ 11 PSIG
INSTRUMENTS—Controllers, Recorders, Indicating and Transmitting
MOTORS—10 HP to 500 HP XP
PIPE CHROME—3¼" to 14" OD
PUMPS—Hot Oil, Steam, Centrifugal
REACTOR—8' x 32'6" OA
REBOILERS—2,700 to 450 sq. ft.
TRANSFORMERS—5 KVA to 333 KVA
VALVES—Diaphragm, Butterfly Slide and Pressure Regulating
VESSELS PRESSURE—3' to 12' Dia.

PETRO CHEM FURNACE
1.9 MILLION BTU NEW 1949

WRITE FOR COMPLETE CATALOG

HEAT & POWER CO. INC.
60 East 42nd St., New York 17, N.Y.
310 Thompson Bldg., Tulsa 3, Okla.
Box 5203, Baltimore 24, Maryland

NEW IDECO RIGS AND MACHINERY

RECONDITIONED AND USED MACHINERY

USED RIGS

FOR RENT: USED IDECO 133' Full View Drilling Mast on 8' high x 46-10" long Substructure. Attractive Rate.
FOR LEASE: USED BREWSTER N-4 Rig Complete. Gas-Butane Power. 93' Lee C. Moore Mast. 5600' of 4" O.D. Drill Pipe.
FOR SALE: USED WAUKESHA 6LRZ Engine with Fawick Clutch mounted on Extended Skid with V-Belt Sheave and Roller Bearing Pillow Blocks.
FOR SALE: USED IDECO H-35 Hydrair Torque Converter Draw Works with 2—Waukesha 6WAK Gas-Butane Engines.
FOR SALE: Two USED BOWEN 7⅝" O.D. Double Bowl Overshots.
FOR SALE: 3,250' USED 4½" Grade E Drill Pipe with 6" O.D. Tool Joints. Inspected, Tested and Graded for Unlimited Service.
FOR SALE: 7,000' NEW 4½" Grade E Drill Pipe. 10% Discount.

LUCEY

LUCEY PRODUCTS CORPORATION
624 So. Cheyenne Tulsa 19, Oklahoma
Phone: LUther 4-4711
Oklahoma City—Woodward, Oklahoma • Dallas—Odessa, Texas

COMPLETE PIPELINE CONSTRUCTION SPREAD
From 30" Down to Smaller Diameter Pipe

Catepillar Tractors (2U and 3T); 320 Cleveland Ditchers; Insley Backhoes; Insley Draglines; Littleford 25-Barrel Dope Pots; C-R-C Bending Machine; M. J. Crose Boring Machine; Ingersoll-Rand Air Compressors; Ample Miscellaneous items to complete a spread of equipment.

Equipment purchased new—most at the same time. Has not worked 50% of time—has laid less than 1,000 miles of pipe. Equipment in good working condition—always been well maintained.

You are invited to inspect equipment. Detailed list of spread with serial numbers furnished on request.

EASTERN PIPELINE CONTRACTORS
820 Mercantile Bank Building, Dallas, Texas

WELL DRILLS—CORE DRILLS. Everything for well and core drilling in both new and used equipment at money saving prices. Fishing tools rented. Send for bulletins. Pressey & Son, Pueblo, Colo.

1—36L BUCYRUS-ERIE drilling machine, 1950 model, skid mounted, with 1956 140 GK Waukesha engine; casing strut, derrick crane casing line. A-1 condition at an exceptionally low price. Located in our yard. Degen Pipe and Supply Co., Tulsa, Oklahoma.

NATURAL GAS Generator Set, 250 KVA 480 volt 3 phase, with Sterling Viking II Engine, GE Generator and switchboard; reduced to $4000. Engine rated 600 HP 1200 RPM, will sell separately. Nourse Equipment Company, 2300—4th Street, Berkeley, Calif.

1—LATE MODEL NKRBU Waukesha with skids and power take off. 1—WAK Waukesha reconditioned with skids and power take off. 1—Twin Disc Model F Torque Converter. All priced reasonable. Claypool Drilling Company, St. Elmo, Illinois, Phone: TAylor 9-3232.

WHEATLEY PIPE-LINE pump—Model WBL-141, duplex reciprocating, 6—7" x 10" side pot valves, skid-mounted; with 100 Hp. electric motor, 3/60/440V, v-belts, sheaves and etc; Complete. One Fractionating Tower —4' x 65', 50 psi. with 25 Trays. Welded. Two Stripper Towers—One 30" x 27' welded; One 24" x 16' welded. Both with bubble trays; Bargains. Kinslow Equipment Company. P. O. Box 5283, Tulsa, Oklahoma. WE 9-6896.

FOR SALE—complete trailer camp consisting of seven trailers and light plant with complete facilities for sleeping and feeding twenty-one persons, which includes all bedding, dishes, cooking utensils, etc. Camp now located at the Trading Post, Round Rock, Arizona, approximately sixty miles North of Window Rock Arizona. Contact Cowden, Cities Service Oil Company, Bartlesville, Oklahoma.

1—4½ x 6 Gardner Denver pump. 1—5 x 8 Gardner Denver pump. 1400'—2⅜ x 20 Mayhew drill pipe—good condition. 1—56' Sectional Mast for Joy 200. Box L-877, The Oil and Gas Journal, Tulsa, Oklahoma.

FAILING 1500 long mast, kelly. KC Franka 5 x 6 pump, core barrels, Hexigon kellys. Fred Butler, Box 481, Pueblo, Colo.

C&S
FOR SALE
200,000 Ft. of 3½" O.D. Seamless A-1 Used Locomotive Tubes, Clean Inside and Out. Roller-Beveled Ends. 18' and over in lengths.
Wire, Write, or Phone
COLUMBUS STEEL SUPPLY
1000 BONHAM AVE. • AX 4-4461
COLUMBUS, OHIO

NEW CROLOY 5 HEATER TUBES
Priced at ½ New Cost
Must Move at Once

14—3¾" x ⅜" wall x 44' long
63—4" x ⅜" wall x 26' long
10—4" x ⅜" wall x 32' long
50—4" x ½" wall x 32' long
3—5" x ½" wall x 42' long
42—6" x ½" wall x 27' to 47' long

HEAT & POWER CO., INC.
60 E. 42nd St., N. Y. 17, N. Y.
310 Thompson Bldg., Tulsa 3, Okla.

EQUIPMENT WANTED

FAILING 2500, Joy 300, or Franks 35 Drilling Rig. With or without accessories. Forward complete details first letter. Must be priced right for quick sale. Box L-871, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

REFINERY INSTRUMENT Engineer with experience on varied type instruments. Give resume of experience, education and salary expected. Box L-843, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER

Graduate chemical engineer with from 1 to 3 years refinery process engineering, preferably including some refinery economics and computer experience. Assignment will be in newly organized computer section.

Send resume of education, experience and salary requirements to:
Personnel Manager
National Cooperative Refinery Ass'n.
McPherson, Kansas

SUPERVISOR FOR REFINERY BLENDING SCHEDULING AND PLANNING SECTION

Immediate opening exists with a Caribbean Oil Refinery for a position entailing product blending, shipment scheduling, and refinery operations planning. This position requires a man with approximately five years experience in practical blending, shipment scheduling, and operations planning, as well as the ability to use mathematical techniques to improve existing blending methods.

Apply, Box L-867
The Oil and Gas Journal
Tulsa, Oklahoma

HELP WANTED

NEW OIL JOB Directory, foreign and domestic, showing where to apply for jobs. 500 selected producing, refining, butane and pipeline companies. Nationwide, $5.00 cash. OIML Co., Box 2603, Tulsa, Oklahoma.

GEOLOGIST TO take charge of exploration for small but aggressive company operating chiefly in the Anadarko Basin. Prefer independent background with good field experience. An excellent opportunity for the right man. Send complete resume' including experience, transcripts and references. We will contact you in regard to an interview. Box L-868, The Oil and Gas Journal, Tulsa, Oklahoma.

REGISTERED CHEMICAL engineer; oil refinery experience. Washington consulting plus refinery inspection work. Send resume and photo—George Armistead Company, 533 Shoreham Building, Washington, D.C.

SITUATIONS WANTED

PETROLEUM ENGINEER (BS)—25 single. Desirous of changing position. Locate anywhere. Resume upon request. Box L-862, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Engineer—Five years diversified field experience in reservoir and production engineering. Married. Available May 31. Box L-856, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM—Corrosion Engineer, B.S. 1952, experience in cathodic protection and oil field operations. Desire position with growth potential. Will relocate. Age 35, married. Box L-854, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER. 19 years experience in petroleum engineering and multifunctional planning work, last 7 years in supervisory managerial posts, desires responsible position petroleum or petrochemical company. Write: Box L-863, The Oil and Gas Journal, Tulsa, Oklahoma.

THINKING of starting a reservoir engineering section? Reservoir and production engineer, age 37, presently working as reservoir engineer in major oil company headquarters office desires job with smaller company or independent. Salary requirement $825. Box L-864, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, 18 years of field and supervisory experience in drilling, production and reservoir engineering. Background includes work in United States, South America, Africa and Middle East. Speaks Spanish and French. Desires responsible position with producing company operating overseas. Box L-870, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM PRODUCTION Engineer: Age 34, married. 4 years experience domestic major, 4 years production supervisor, Venezuelan major. Desires position with aggressive domestic independent or foreign. Box L-872, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION SUPERINTENDENT—Geologist: 35, married, conscientious. Ten years experience in Oklahoma, Kansas, Colorado as production and drilling supervisor, explorationist. Salary nominal—Available two weeks notification. Box L-875, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGICAL ENGINEER—M.G.E. 1960, married, 24, honors student, desires work in exploration and development with active, successful operator. Box L-874, The Oil and Gas Journal, Tulsa, Oklahoma.

PRESENTLY EMPLOYED SUCCESSFUL

Major company executive, manager of exploration and production in complete charge of all domestic and foreign operations, desires permanent job with Independent. Title, position, salary no object, but congenical, harmonious, informal environment a must.

Box L-873
The Oil and Gas Journal
Tulsa, Oklahoma

ROYALTIES

HIGHEST PRICE paid for income royalties, overrides, oil properties. A. S. Berry, 109 Midco Bldg., 302 South Cheyenne, Tulsa, Oklahoma.

NOTICE INVESTORS, income producing oil, gas-distillate royalties for sale. Ogden Oil Company. P. O. Box 490, Taylor, Texas.

LEASE AND DRILLING BLOCKS

SEVEN wells Louisiana: 1,500' Wilcox sand, 113 acres, 20 proven locations. $35,000. C. R. Harwood, 500 Grant Street, Denver, Colorado. Phone Spruce 7-4493.

MINERAL INTERESTS Webster, Bossier Parishes, La., Liberty, Harris, Cherokee, Delta Counties, Tex., Miller County, Ark. Mason, 103 Ardmore, Shreveport, La.

3,500 ACRES $2 per acre. Lawrence County, Ky. in midst of new gas play. Ten year leases in first year, 1/8 override, no drilling committment, 50 cents per acre annual rental. U. S. Andersen, 8350 Santa Monica Blvd., LA 46.

PROSPECTIVE OIL Land: Suitable townsite acreage in fee, E/35 acres, Sec. 16, Block JKL, PSL Survey, Hudspeth County, Texas, at intersection U. S. Highway 62 and F. M. 1437 Highway, south of Dell City, Texas. Write quickly, Jefferson G. Smith, 715 Littlefield Building, Austin 15, Texas.

WILL FARM OUT 160 acres on immediate drilling commitment in Woodward County, Oklahoma, Sec. 20 T. 24 N. Range 20 West. Only responsible people considered. Oexner Oil Producing Co., 318 Adams Bldg., Danville, Illinois.

MICHIGAN OIL gas leases, blocks and drilling deals. Lease Broker, member Petroleum Landmens associations. Neil Wagenaar, 504 Peoples Natl. Bank Bldg., Grand Rapids, Michigan.

NOTICE OF PROPOSED SALE OF OIL AND GAS LEASES AND OTHER PROPERTIES BY TEXAS CONSOLIDATED OILS

This is to give notice that Texas Consolidated Oils, 35th Floor Southland Center, Dallas 1, Texas, desires to sell all of its producing and non-producing oil and gas leases in Texas, Oklahoma, New Mexico, Louisiana, Kansas and California; and other related property. Anyone interested in making a sealed bid for the purchase of these properties may obtain bidding forms and a statement of the terms and conditions relating thereto, with a schedule of property being offered for sale attached, by writing the Company at the above address. A packet containing individual lease plats, production data, and other general information will be available to prospective bidders upon deposit or One Thousand Dollars ($1,000.00). Such deposit will be returned by the Company to any party making a bid on these properties or upon return of the packet of data forty-eight (48) hours or more in advance of 10:00 A.M. Central Standard Time on July 13, 1960. Bids for the properties will be considered only if made in accordance with and subject to the terms and conditions set forth in such statement. All bids must be presented to or received by:

The Trust Department
Republic National Bank of Dallas, Texas
before 10:00 A.M., Central Standard Time
on July 15, 1960

BUSINESS OPPORTUNITIES

FINANCIAL Contacts, Underwriters, Private Brokers reached. No shopping. Confidential. Send details to Consultant—817—51st Street, Brooklyn, N. Y.

ATTENTION MANUFACTURERS

Nine thousand sq. ft. of new building area, personnel, and equipment available for the manufacture, assembly and storage of your product in Canada.

GEORGE CARRAHER
9724 141 St.
Edmonton, Alberta, Canada

BUSINESS OPPORTUNITIES

DELAWARE CORPORATIONS formed and serviced. American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware.

$80,000.00 LOAN needed for cost-cutting production facilities and twenty additional sales outlets for patented, proven oil production tool. 1959 sales up 31% over 1958. Very limited competition. Box L-876, The Oil and Gas Journal, Tulsa, Oklahoma.

BUSINESS SERVICE

HENDRIX & McCLAIN, INC.
GEOLOGICAL CONSULTANTS
Serving the Oil and Gas Industry
in
Eastern Colorado
and
The Gulf Coast
1340 Saratoga Bldg.
JA 2-6330 and JA 2-4364
New Orleans 12, Louisiana

REAL ESTATE

RANCH

75 sq. miles finest grazing land in So. West. Lge. ranch home w/pool, 3 BR guest house, gate house, foremans house. Hunting lodge bordering famous resort area. Private air field & 'xclnt. airline connections. 22,000 deeded acres w/ minerals. 750 cow cpcy. w/2000 head potential. 'xclnt. opportunity for long term cap. gains while utilizing $350,000 to $400,000 depreciable improvements. Total price $550,000. w/29% dn. 5 yrs. on bal. exclusive w/ **REX A. EVENSON, RANCH BROKER, BRIGGS LAND CO., INC., 2935 E. BROADWAY, TUCSON, ARIZ., TEL. EA 7-4907.**

MANUSCRIPTS

HAVE YOU WRITTEN A BOOK?

If you have a book manuscript or outline for a book on an oil industry engineering, operating or technical subject—we are in a position to help you get it published. Write briefly outlining what you have!

Write to—**L. B. Lofton**
THE OIL AND GAS JOURNAL
P. O. Box 1260—Tulsa 1, Okla.

PRODUCTION WANTED

WANTED: Producing lease that can be operated on farmout basis, 30 bbls. or more oil. Box L-861, The Oil and Gas Journal, Tulsa, Oklahoma.

PURCHASE
OIL & GAS PROPERTIES

Principal wishes to purchase developed reserves. Location no factor. Confidential and expeditious consideration of any property between $50,000 and $5,000,000. Brokers protected.

Write or call our agent:

R. A. MASON, Petr. Engr.
2212 First National Bldg.
Oklahoma City, Oklahoma
Phone: CEntral 5-4468

LEGAL

SEALED BIDS will be received until 2:00 P. M., July 7, 1960, Pacific Standard Time, and opened at that time in the office of the Western Washington Indian Agency, Everett, Washington, for the leasing of 2005.69 acres of allotted Indian land, located in Township 30 North, Ranges 4 and 5 East, Snohomish County, Washington, for oil and gas mining purposes. The details of the lease offering and how and where to file bids may be obtained by addressing the enquiry to the Superintendent of the Western Washington Indian Agency, at 1620 Hewitt Avenue, Everett, Washington.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Land Office, Salt Lake City, Utah. Notice is hereby given that approximately 80 acres of unsurveyed land in one parcel within the undefined known geologic structure of the Harley Field Area, Grand County, Utah, will be offered for competitive oil and gas leasing through sealed bids to the qualified bidder of the highest cash amount per acre at 1:00 P.M., M.S.T., July 15, 1960, when bids will be opened. Full details of the lease offering, and how and where to submit bids, may be obtained from the Land Office Manager, 3rd Floor Darling Building, Salt Lake City, Utah.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that approximately 1035.51 acres of land within the Navel Auxiliary Air Station, Chase Field, Bee County, Texas, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1:00 P.M., E.D.T., July 13, 1960, when bids will be opened. Details of the lease offering, how and where to submit bids, may be obtained from the Director, Bureau of Land Management, Department of the Interior, Washington 25, D. C., the Land Office, Bureau of Land Management, P. O. Box 1251, Santa Fe, New Mexico; the Branch of Oil and Gas Leasing, Geological Survey, General Services Administration Building, Washington 25, D. C.; or the Regional Oil and Gas Supervisor, Geological Survey, Gulf Coast Region, 204 Maritime Building, 203 Carondelet Street, New Orleans, Louisiana. Edward Woozley, Director.

OIL AND GAS **JOURNAL**
Box 1260
TULSA, OKLAHOMA

Please check one so we can be of more help to you.

- ☐ We sell equipment.
- ☐ We want equipment.
- ☐ Need personnel.
- ☐ Want new job.
- ☐ Buy, sell leases or royalties.
- Other ☐ _____

Classified Advertising may help me. Will you send me complete information, including rates.

NAME _____ TITLE _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE ___ STATE _____

More Discovery Wells

(Continued from page 185)

NEW MEXICO

Eddy County:

Ohio Oil Co. 1 Andrew Armquist-State, 1 mile southwest of Dayton in 29-18s-26e. IPCAOF 545 M.M.c.f.d., Bend 9,060-9,120 ft. TD 9,178 ft. PBTD 9,136 ft. New gas discovery.

Lea County:

James G. Brown & Associates 1 Lion-State, 20 miles southeast of Caprock in 9-14s-33e. IPP 261 BOPD, 41°, Penn. 9,954-80 ft. TD 10,100 ft. New oil discovery.

Rio Arriba County:

El Paso Natural Gas Products 1 NCRA, NE NE 3-26n-7w. IPF 2,800 M.c.f.d., ¾-in. choke, Dakota 7,256-7,336 ft. TD 7,480 ft. Dakota discovery, new field.

El Paso 127 Rincon Unit, NE NE 28-27n-7w. IPF Mesaverde 1,499 M.c.f.d., ¾ in. choke, Dakota 4,717 M.c.f.d., ¾-in. choke. Mesaverde 8,328-5,500 ft., Dakota 7,364-7,586 ft. Dakota discovery, new field. TD 7,700 ft.

San Juan County:

Royal Development Co. 3 Royal-Ake, NE NW 10-24n-8w. IPP 120 BOPD, Gallup open hole 5,682-6,100 ft. TD 6,937 ft. Gallup discovery, new field.

Compass Exploration Co. 1-35 Federal, NW NW 35-30n-14w. IPF 6,710 M.c.f.d., ¾-in. choke, Dakota 5,798-5,925 ft. TD 6,095 ft. Dakota discovery. new pool.

EAST TEXAS

Panola County:

Jack I. Phillips 1 A. R. Scharmaegel, C. Lindsey Sur., A-387, 4 miles southeast of Pine Hill. Calculated open-flow potential 3,600 M.c.f.d., 28.4 BC per M.M.c.f., 58°, perf. 6,697-6,702 ft., lower Pettet. TD 6,910 ft. New-field discovery.

Wood County:

Shell Oil Co. and R. J. Caraway 1 C. C. Blackwell. William Barnhill Sur., 6 miles northeast of Quitman. IP 88 BCPD (19-hour test), gas ungaged, ¼-in., 65.5°, TP 870 psi., perf. 8,440-68 ft., Rodessa, and 915.8 M.c.f.d. (19-hour test), 38 BC per M.M.c.f., 54.5°, TP 657 psi., perf. 8,732-40 ft., Pettet. TD 8,963 ft. New reservoir discovery ¾ miles northwest of Manziel field.

NORTH TEXAS

Clay County:

Tex-Mem Oil Co. 2 R. H. Peterson, ½ mile southwest of Shannon on T. F. Johnson Sur. IPP 60 BOPD, plus 23% water, 42°, GOR 300:1. Strawn 4,171-87 ft. TD 5,469 ft. New oil discovery.

Cooke County:

Prince 4,400-ft. Strawn sand field. C. C. Parfet et al., 9 J. F. Bugg "B," 6 miles northeast of Gainesville on John Martin Sur. A-714. IPP 121 BOPD, 34°, 4,393-4,407 ft. TD 4,463 ft. New oil discovery.

Jack County:

Texaco Inc. 1 Ben Gunter, Riggs North Strawn field. Menan Mills Sur., A-417. IPP 83 BOPD, 42°, Strawn 3,340 ft. TD 5,604 ft. PBTD 3,380 ft. New oil discovery.

Wichita County:

Cascade Petroleum Co. 15 Jones-Payne, 8 miles southwest of Wichita Falls, BBB&C Sur., A-30. IPP 112 BOPD, plus 20% water, 42°, GOR 1,000:1. Hull-Silk 4,410-35 ft. TD 5,350 ft. New oil discovery.

ADVERTISERS

. . . in this issue

A

Allis-Chalmers 17, 19
Aluminum Co. of America 26
American Iron & Machine Works Company, Inc., Subsidiary of American Machine & Foundry Company 83
American Machine & Foundry Company, American Iron & Machine Works Company, Inc., Subsidiary 83
American Steel & Wire Division 109

B

Baker Oil Tools, Inc. 58
Bank of Montreal 62
Bethlehem Steel Company 130
B-I-F Industries 55
Broderick & Bascom Rope Co. Back Cover
Brown & Sharpe Mfg. Co. 86

C

Cardwell Mfg. Co., Inc. 27
Caterpillar Tractor Co. 6, 7, 51
C-B Southern, Inc. 38
Central Scientific Co. 155, 156
Chase & Sons, Inc. 155
Cities Service Company 4
Classified Advertising 196, 197, 198
Continental-Emsco Company, a Division of the Youngstown Sheet and Tube Company 9, 10, 11, 12
Coors Porcelain Company 134
Core Laboratories, Inc. 166
Crane Co. 117. 118, 119
Crossett Chemical Company Division of The Crossett Company 175
Cummins Sales & Service, Inc. 154

D

Dover Corporation—The W. C. Norris Manufacturer Division 54, 180
Dowell ..... 1, 162, Inside Back Cover
Dresser Manufacturing Division 178
Drilco Oil Tools, Inc. 127
Drilling Equipment Manufacturing Co. 50
du Pont 32

F

Fairbanks, Morse & Co. 133
Federal-Mogul Service, Division of Federal-Mogul-Bower Bearings, Inc. 46
Ford Motor Company 148
Foxboro Company, The 31
Franks Division of Cabot Shops, Inc. 124, 125
Fuller Company 144, 145

G

General Electric Company 41
Geolograph Oil Field Services 163
Goodwin Company, Percy H. 155
Goulds Pumps, Inc. 21, 22, 23
Grinnell Company, Inc. 3
Griscom-Russell Co., The 20
Grove Valve and Regulator Company 89
Gulberson Corporation 25

H

Halliburton Oil Well Cementing Company 5, 164, 165
Harbison-Fischer Mfg. Co. 49
Harco Corporation, The 142
Hayes, Inc., C. I. 151
Homco 52, 53
Hycalog, Inc. 47

I

IDECO, One of The Dresser Industries 33

J

Jensen Bros. Mfg. Co., Inc. 176
Jo-Bell Products, Inc. 153
Jones & Laughlin Supply Division 60, 61
Jones Company, The S. M. 115

K

Kelley Company, Ben F. 121
Kellogg Co., The M. W. 34, 35
Kemp Mfg. Co., C. M. 24
Kerotest Manufacturing Company 79

L

Larkin Packer Company, Inc. 48
Layne & Bowler, Inc. 75
Lehman Brothers 160
Liberty Manufacturing Company of Texas 15
Linde Company, Division of Union Carbide Corporation 150

M

Magnet Cove Barium Corp. 29
Marbon Chemical Division of Borg-Warner 13
Mid-Continent Supply Company 92
Mission Mfg. Company 45
Morse Chain Company—A Borg Warner Industry 40

N

Nalco Chemical Company 39
National Supply Company, Subsidiary of Armco Steel Corporation 181, 182, 183, 184
National Tank Company 200
Nelson Electric Mfg. Co. 158
Nordstrom Valve Division, Rockwell Manufacturing Company 110, 111
Norris Manufacturer, W. C. Division of Dover Corporation 54, 180

O

Ohio Rubber Company, The 28
Oil Center Tool Co. 129
Oil States Rubber Company 174
Oil Well Supply Division 2
Orbit Valve Company 139
Otis Engineering Corporation 43, 149

P

Paris Distributor, Inc., Henry H. 154
Peerless Pump Division of Food Machinery & Chemical Corporation 112
Petroleum Distributing Company 163
Petroleum Electric Power Assn. 8
Pipe Linings, Inc. 161
Plastic Applicators, Inc. 152, 153
Powell Valves 18
Procon Incorporated 37

R

Reed Roller Bit Company 90, 91
Refinery Supply Co., The 155, 156
Republic Steel Corporation 136, 137

S

Salt Water Control, Inc. 179
Sauder Tank Co., Inc. 180
Schlumberger Well Surveying Corp. 147
Southwestern Graphite Co. 170
Square D Company 14
Stauffer Chemical Company 16

T

Templeton, Kenly & Co. 142
Thompson Pump Company 121
Toledo Pipe Threading Machine Co., The 156
Tulsa Paper Company 180

U

United States Borax & Chemical Corporation 177
United States Steel Corporation—Oil Well Supply Division 2

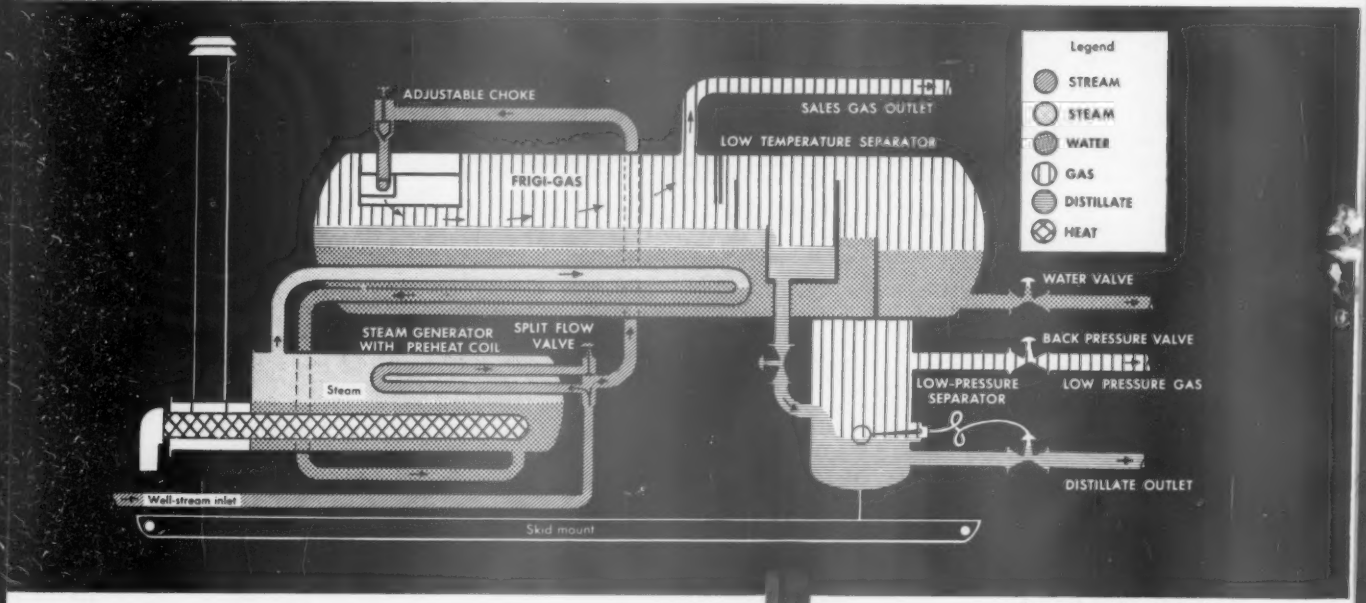
V

Vogt Machine Co., Henry 42

W

Waukesha Motor Company 30
Welex, Inc. 56
Well Equipment Mfg. Corp. 157
Western Company, The Inside Front Cover
Wheland Company, The 36
Williamson, Inc., T. D. 156
Wilson Manufacturing Company 172, 173
Worthington Corporation 141

NATIONAL® FRIGI-GAS UNITS



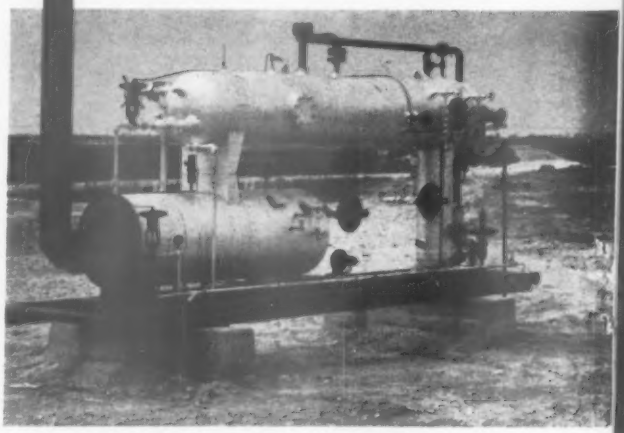
Patented and Patents Pending

National designed this distinctly new and improved method for handling high to moderate pressure distillate wells, particularly when flow rate requirements vary over a wide range of operations, i.e. rates from one tenth (1/10) of a million per day up to rated recommended capacities, with ability to care for wide differences of throughput during the same 24 hour period.

The National Frigi-Gas Unit consists of a low temperature oil-gas-water separator with steam-heated base, choke and automatic controls; a steam generator with preheat coil; a low-pressure flash separator with automatic controls and all piping, valves, gages, skids, safety features and all other accessories.

- Single heat source
- Low operating temperature
- Produces clean, dry gas
- Disposes of water separately
- Maximum liquid recovery at lowest attainable separation temperature
- Collects distillate separately
- Will handle larger quantities of paraffin, drilling mud and other foreign substances than conventional designs
- Another "PACKAGED UNIT" by National

For High, Low, Medium flow rates for the separation of gas, water, and distillate at/-or below hydrate temperatures especially at varying flow rates.

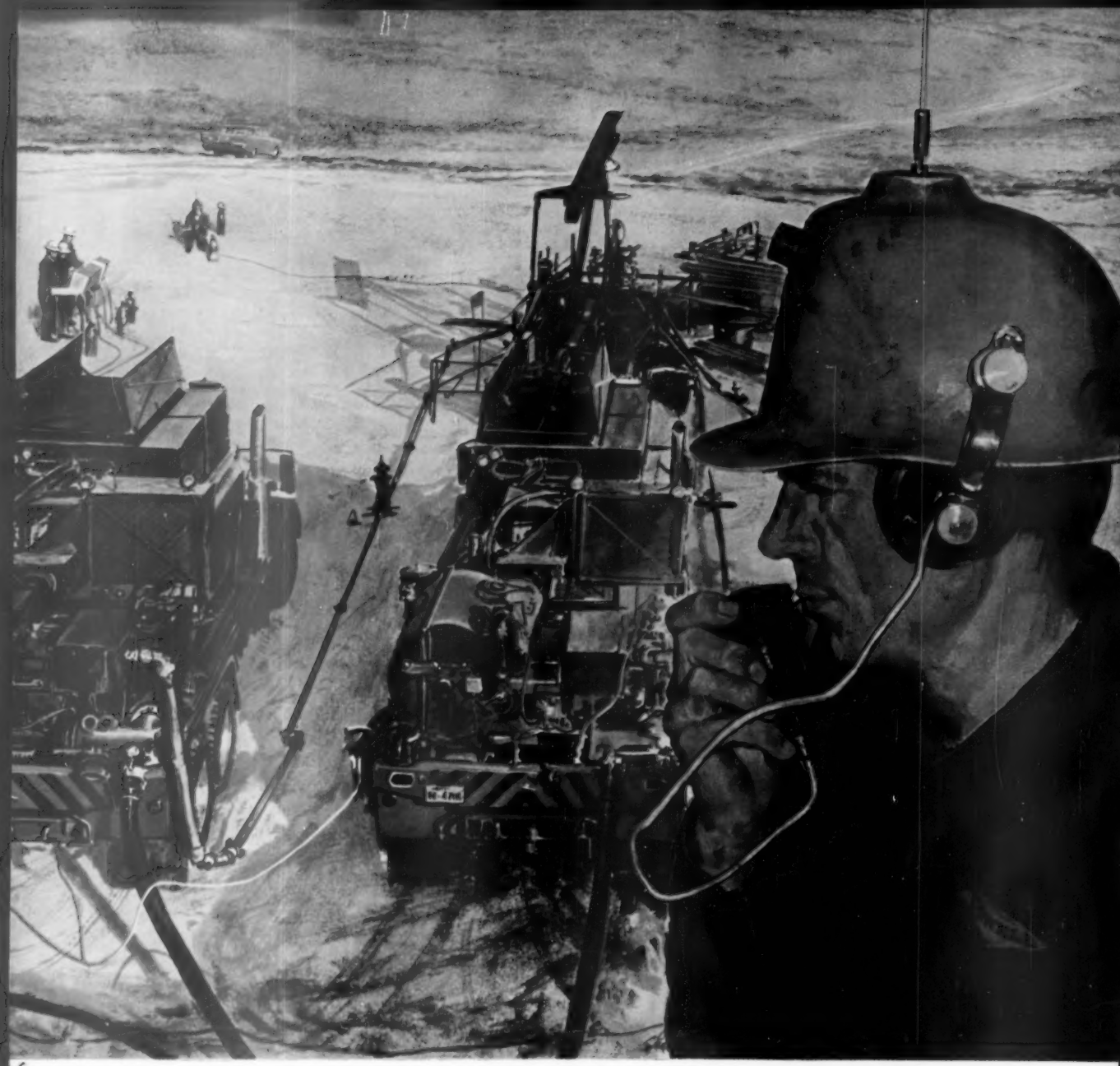


National can handle all your gas production problems from the Wellhead to the Consumer

It's a National®

NATIONAL TANK COMPANY

TULSA, OKLAHOMA



HOW MANY PROGRESSIVE IDEAS CAN YOU SPOT AT THIS DOWELL FRAC JOB?

Fracturing has come a long way in the past 10 years. And new ideas continue to improve this method of well stimulation. Pictured above are just four of the contributions Dowell has made to help you get more oil through better fracturing. *Allison aircraft engine-powered pumpers*—compact, powerful. *Remote control panels*—for safer, exacting control of the job. At the well, the special *frac header*—for more safety, efficiency. The new *radio helmets*—for even better control of the job. Not shown, but also important: *Abrasijet,** abrasive perforating service—to reduce breakdown pressures; and the *"Frac Guide"** —for really precise engineering of treatments. New ideas . . . more for your money . . . *dial Dowell.* Dowell, Tulsa 1, Okla.

*Dowell Trademark

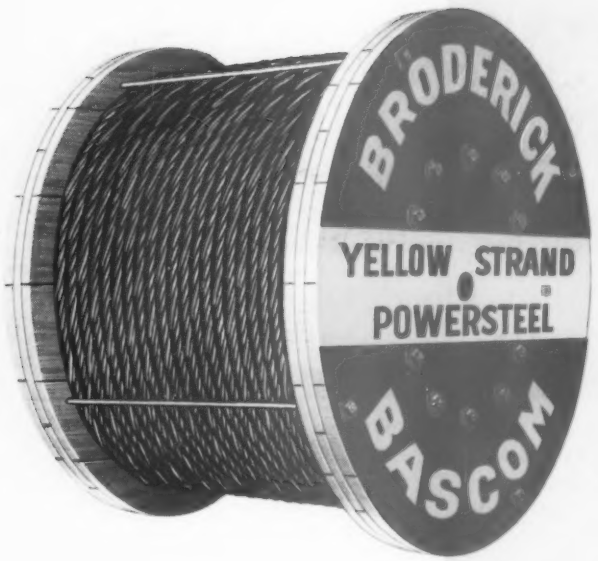
Services for the oil industry

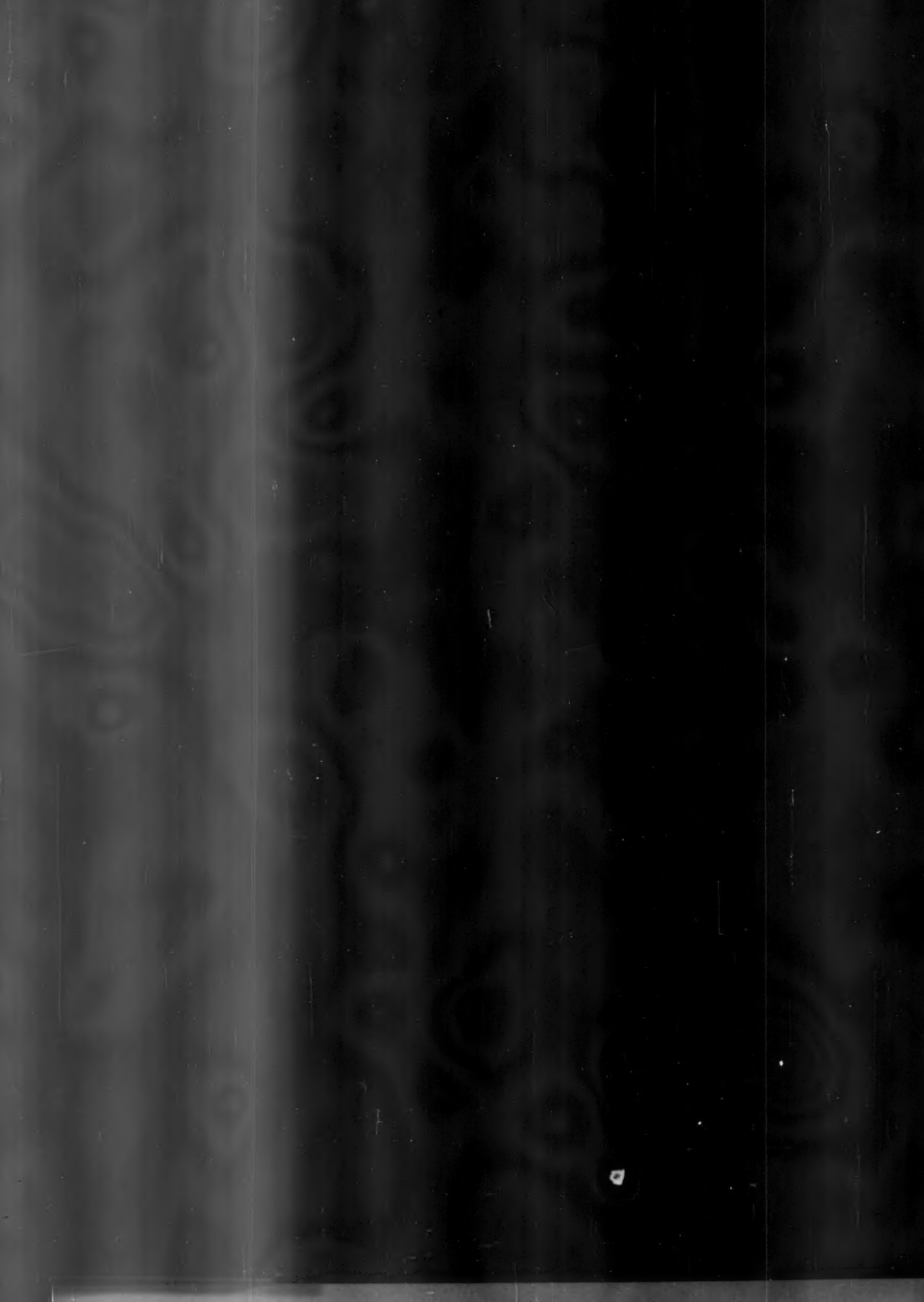
DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

Symbols of Service in the oil fields

For more than a quarter century, Continental-Emsco Company has been a leading distributor of Yellow Strand Wire Rope. Throughout this long and close sales alliance, Continental and Yellow Strand have continuously provided quality products and service to the oil and gas industries. Today, the familiar green triangle — Continental's symbol of service — is seen and respected in the U.S.A. and foreign countries.



Just as Continental-Emsco stands for unexcelled oil field service, so does Yellow Strand by Broderick & Bascom. B & B supplies quality wire rope for oil field use . . . quality in uniformity, ease of handling, long life and low cost per ton-mile of service. For accurate, informative selection and prompt delivery of the right type and size wire rope, see your Continental-Emsco Yellow Strand distributor! *Broderick & Bascom Rope Co., 4203 Union Blvd., St. Louis 15, Mo.*

Yellow Strand®
"POWERSTEEL"®
WIRE ROPE